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JOHN BARTON PAYNE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Water-Supply Paper 481

SURFACE WATER SUPPLY OF THE UNITED STATES
1918

PART XI. PACIFIC SLOPE BASINS IN CALIFORNIA

NATHAN C. GROVER, Chief Hydraulic Engineer
H. D. McGLASHAN AND F. F. HENSHAW, District Engineers

Prepared in cooperation with
THE STATES OF CALIFORNIA AND OREGON

WASHINGTON
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1921

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SURFACE WATER SUPPLY OF PACIFIC SLOPE BASINS IN CALIFORNIA, 1918.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting records of measurements of flow made on streams in the United States during the year ending September 30, 1918.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

> *Provided*, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies relating to irrigation in the arid West. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ending June 30, 1895–1919.

1895	$12,500.00
1896	20,000.00
1897 to 1900, inclusive	50,000.00
1901 to 1902, inclusive	100,000.00
1903 to 1906, inclusive	200,000.00
1907	150,000.00
1908 to 1910, inclusive	100,000.00
1911 to 1917, inclusive	150,000.00
1918	175,000.00
1919	148,244.10

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgements for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknoweledged on page 13.

Measurements of stream flow have been made at about 4,510 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1918, 1,180 gaging stations were being

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maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time. Information in regard to publications relating to water resources is presented in the appendix to this report.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miners' inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in depth in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, and acre-feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off (depth in inches)" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

"Stage-discharge relation;" an abbreviation for the term "relation of gage height to discharge."

"Control;" a term used to designate the section or sections of the stream channel below the gage which determine the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

The "point of zero flow" for a given gaging station is that point on the gage—the gage height—to which the surface of the river falls when the discharge is reduced to zero.

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EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1916, and ending September 30, 1918. At the beginning of January in most parts of the United States much of the precipitation in the preceeding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter. (See Pls. I, II.) The general methods are outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to the gage heights, give the discharge from which the daily, monthly, and yearly means of discharge are determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving records of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage height and records of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanence of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuations the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day.

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If such stations are equipped with water-stage recorders, the mean daily discharge may be obtained by averaging discharge at regular intervals during the day or by using the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet per second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 10, are based.

ACCURACY OF FIELD DATA AND COMPUTED RECORDS.

The accuracy of stream-flow data depends primarily (1) on the permanency of the stage-discharge relation and (2) on the accuracy of observation of stage, measurement of flow, and interpretation of records.

A paragraph in the discription of the station gives information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage height to the rating table to obtain the daily discharge.

For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large non-contributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "run-off (depth in inches)" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square

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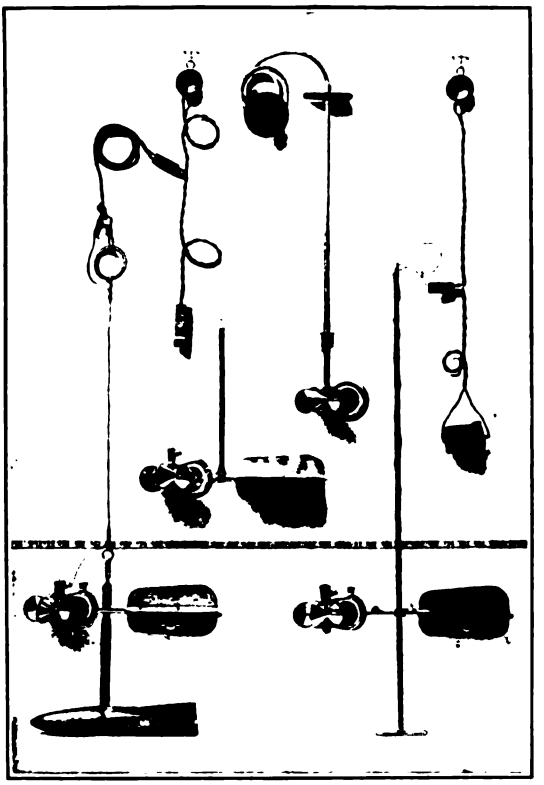
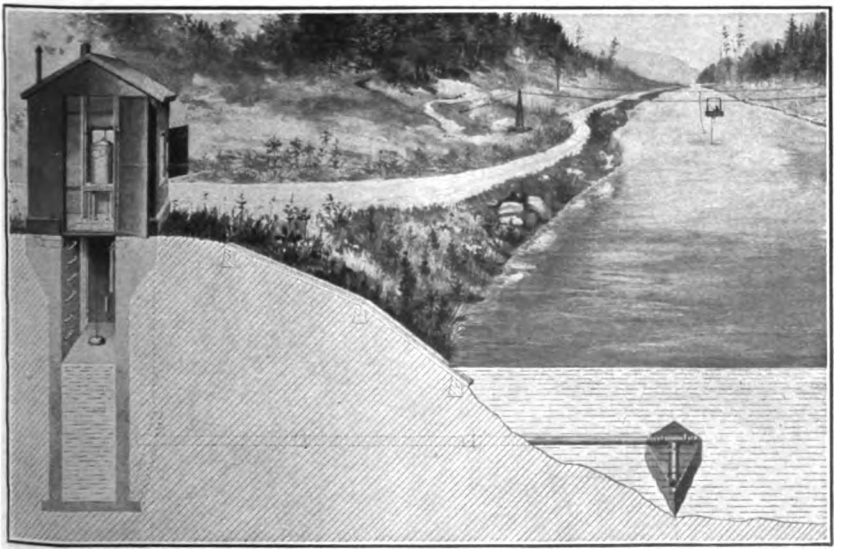


A. PRICE CURRENT METERS.



B. TYPICAL GAGING STATION.

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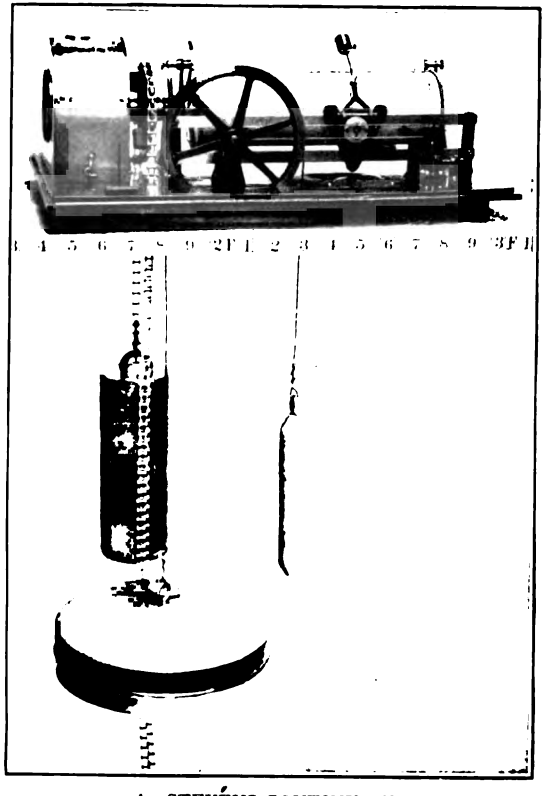
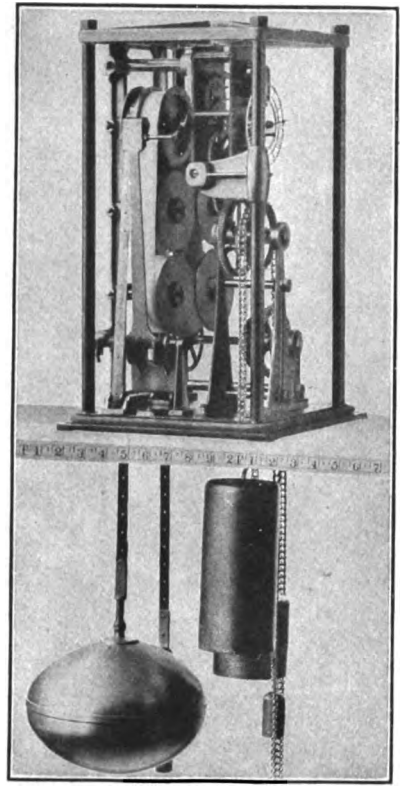
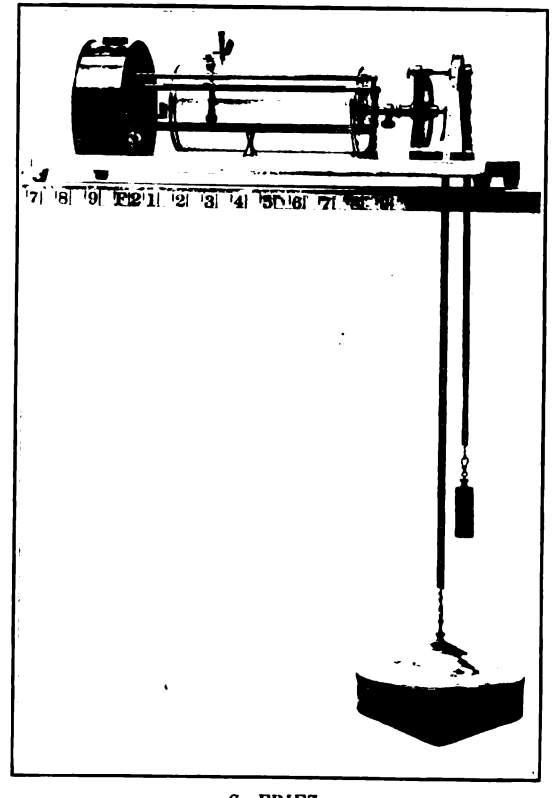


A. STEVÉNS CONTINUOUS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

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mile" and "run-off (depth in inches)" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

Investigation of the water resources of California is being carried on by the United States Geological Survey in cooperation with the State in accordance with acts of the State legislature approved March 16, 1903, March 20, 1905, March 11, 1907, and April 22, 1909, empowering the State authorities to enter into contracts with the Director of the United States Geological Survey for the purpose of making topographic maps, gaging streams, and surveying reservoir sites and canal locations for the conservation and utilization of the flood and storm waters of the State. The work for the year 1917–18 was maintained in accordance with the contract approved by the State board of control and signed by W. F. McClure, State engineer.

Additional funds for the maintenance of river-measurement stations were furnished by the State Water Commission of California. The members of the commission are A. E. Chandler, president, W. A. Johnstone and Irving Martin, commissioners; W. D. Stephens, governor; and W. F. McClure, State engineer. Josephine A. Patten is secretary.

The entire expense of the stream-flow investigations in Tuolumne River drainage basin for the Hetch Hetchy project is paid by the city and county of San Francisco, through M. M. O'Shaughnessy, city engineer.

All stations in Los Angeles County, except that on San Gabriel River, are maintained in accordance with a contract between the county board of supervisors, the United States Department of Agriculture, represented by the Forest Service through F. H. Fowler, district engineer, and the United States Weather Bureau, through Ford A. Carpenter, meteorologist, and the United States Geological Survey. Los Angeles County pays all expenses of the field work except services furnished by the Forest Service, Weather Bureau, and Geological Survey. The Geological Survey supervises the work and compiles all field data for publication.

Assistance in the maintenance of river-measurement stations was furnished by the United States Forest Service, through F. H. Fowler, district engineer; United States Weather Bureau, through Ford

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A. Carpenter, W. E. Bonnett and N. R. Taylor, meteorologists; United States Indian Service; United States Bureau of Fisheries; Yosemite National Park, through W. B. Lewis, superintendent; County of Los Angeles; Santa Barbara Water Commission; Volcan Land & Water Co. and Cuyamaca Water Co., through Ed. Fletcher, manager, and W. S. Post, consulting engineer; Southern California Edison Co., through H. W. Dennis, construction engineer; and Turlock, Modesto, Oakdale, and South San Joaquin irrigation districts.

Many complete records of run-off, gage-height records, and discharge measurements are furnished by Federal bureaus, private companies, and individuals who are interested in the water resources of California. This cooperation is acknowledged and explained in the descriptions that precede the records.

The work in Oregon was carried on under a cooperative agreement with the State through John H. Lewis, State engineer. Financial cooperation was also furnished by the United States Indian Office, Goose Lake Valley Irrigation Co., Talent Irrigation District, and Medford Irrigation District.

DIVISION OF WORK.

The data for stations in California were collected and prepared for publication under the direction of H. D. McGlashan, district engineer, by William Kessler, F. C. Ebert, Charles Leidl, J. F. Kunesh, C. J. Emerson, C. W. Sopp, H. J. Tompkins, Ernest Tompkins, and A. M. Machin.

The field work in Oregon was carried on under the direction of F. F. Henshaw, district engineer, by R. C. Briggs, and by H. W. Humphrey, hydrographer of the United States Reclamation Service. The ratings, special estimates, and computations were made and data prepared for publication by F. F. Henshaw, district engineer, assisted by C. L. Batchelder, R. C. Briggs, and H. W. Humphrey.

GAGING-STATION RECORDS.

SWEETWATER RIVER BASIN.

SWEETWATER RIVER NEAR DESCANSO, CALIF.

LOCATION.—In SE. ¼ sec. 25, T. 15 S., R. 3 E., at Ellis ranch, 2 miles below mouth of Guatay Creek and 1½ miles below Descanso, San Diego County.

DRAINAGE AREA.—43.7 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 21, 1905, to September 30, 1918.

GAGE.—Staff in three sections on left bank a short distance below intake of Ellis ditch. Previous gages were at approximately the same location but at different datums. Read by C. H. Ellis.

DISCHARGE MEASUREMENTS.—Made from cable just below gage or by wading.

CHANNEL AND CONTROL.—Channel is cut in sand and fine gravel; bed shifting. Banks are generally high and not likely to be overflowed. A group of large boulders about 125 feet below gage acts as a partial control.

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Extremes of discharge.—Maximum stage recorded during year, 4.3 feet during morning of March 12 (discharge about 1,720 second-feet); minimum stage not known; record incomplete.

1905–1918: Maximum stage recorded, not known, occurred January 27, 1916 (discharge, 9,870 second-feet); stream dry during a portion of the years 1910, 1911, 1913, and 1916.

Diversions.—About 0.3 second-foot is diverted above gage for irrigation on Ellis ranch.

Regulation.—None.

Accuracy.—Stage-discharge relation not permanent. Several fairly well defined rating curves were used for short periods. Gage read to hundredths twice a day except October 28 to November 3, January 2–5, June 10–15, and July 28 to September 30, when no observations were made. Daily discharge read from rating curves covering short periods or interpolated between discharge measurements. For periods not covered by gage heights discharge was interpolated or estimated from records on other streams. Records for first half of year, fair; remainder poor.

Discharge measurements of Sweetwater River near Descanso, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 22	F. C. Ebert	0.00	0.8	Mar. 7	H. D. Ellis	0.27	6.2
Jan. 1	Ebert and Ellis	−0.20	.4	8	do	.56	31
9	H. D. Ellis	.00	.8	9	F. C. Ebert	.25	8.6
13	do	.46	13	13	H. D. Ellis	1.52	141
27	do	.17	3.7	19	do	1.41	25
Feb. 11	do	.12	1.4	19	do	1.65	138
20	do	.17	4.6	May 7	F. C. Ebert	.67	2.7
22	do	.54	23	29	H. D. Ellis	.46	4.4
				Aug. 22	F. C. Ebert	−0.16	.3

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Daily discharge, in second-feet, of Sweetwater River near Descanso, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	0.9	0.8	0.9	0.4	3.2	4.8	31	5.5	3.5	4.0
2	.9	.8	.9	.5	3.4	5	31	4.0	3.7	4.4
3	.8	.8	.9	.6	3.8	5	30	3.0	3.5	4.4
4	.8	.8	.9	.7	3.6	5	30	2.5	3.5	4.0
5	.9	.8	.9	.8	3.0	4.8	29	2.5	3.5	3.5
6	.9	.9	.9	.8	1.4	5	28	2.5	3.5	3.0
7	.9	.8	.8	.8	1.0	7	28	2.5	3.5	3.0
8	.9	.9	.8	.8	1.0	22	27	2.5	3.5	3.2
9	.9	.9	.9	.9	1.0	12	26	2.5	4.0	2.4
10	.9	.9	.9	.9	1.0	10	26	2.6	4.0	2.2
11	.8	.9	.9	.9	1.0	630	24	2.7	4.0	1.6
12	.8	.9	.9	.9	1.0	910	20	2.8	4.0	1.0
13	.8	.9	.8	8	1.0	130	17	2.8	4.0	.8
14	.9	.9	.8	3.6	1.0	100	15	3.0	4.0	.5
15	.9	.9	.8	3.2	1.0	80	14	3.1	4.0	.4
16	.9	.9	.9	3.2	1.0	60	15	3.2	35	.4
17	.9	.9	.8	2.8	1.0	40	14	3.3	2.0	.4
18	.8	.9	.8	2.5	6.5	24	14	3.4	1.8	.4
19	.8	.9	.8	2.2	6.5	82	14	3.5	3.0	.4
20	.8	.9	.8	2.2	6	40	14	3.6	.7	.4
21	[illegible]	.9	.8	2.2	7	28	13	3.7	.5	.4
22	[illegible]	.9	.8	2.1	19	36	13	3.8	.8	.4
23	.8	.9	.9	2.2	8.5	40	13	3.9	1.2	.3
24	8	.9	.9	2.4	7	40	13	4.0	1.8	.3
25	8	.9	.9	2.2	7	40	13	4.1	2.4	.3
26	.8	.9	.9	2.7	6	36	13	4.2	2.9	.3
27	.8	.9	.9	3.6	5	35	11	4.3	3.2	.3
28	.8	.9	.8	3.8	4.7	35	10	4.4	3.2	.3
29	.8	.9	.8	3.2	.....	34	9.5	4.4	3.7	.3
30	.8	.9	.8	3.2	.....	34	7	4.0	4.0	.3
31	.8	.....	.9	3.0	.....	33	.....	3.7	.....	.3

NOTE.—No gage-height record Oct. 28 to Nov. 3; Jan. 2–5, discharge interpolated; June 10–15 and July 28–31, discharge estimated; Aug. 1 to Sept. 30, estimated as 1 second-foot.

Monthly discharge of Sweetwater River near Descanso, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0.9	0.8	0.84	51.6
November	.9	.8	.88	52.4
December	.9	.8	.85	52.3
January	8.0	.4	2.17	133
February	19	1.0	4.02	223
March	910	4.8	82.8	5,090
April	31	7	18.8	1,120
May	5.5	2.5	3.42	210
June	35	.5	4.08	243
July	4.4	.3	1.42	87.3
August	.....	.....	[a] 1.0	61.5
September	.....	.....	[a] 1.0	59.5
The year	910	.....	10.2	7,380

[a] Estimated.

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SAN DIEGO RIVER BASIN.

SAN DIEGO RIVER NEAR SANTEE, CALIF.

LOCATION.—In El Cajon grant, at old Mission dam, below Spring Canyon and just above Oak Canyon, 4½ miles west of Santee, San Diego County.

DRAINAGE AREA.—375 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 25, 1912, to September 30, 1918 (record not complete).

GAGE.—Staff in two sections installed December 12, 1916. Lower section is bolted to upstream face of old dam near left end. Upper section fastened to large sycamore tree on left bank just above dam. Original location and datum have been maintained. Zero of gage is 266.42 feet above sea level, U. S. Geological Survey datum. Gage read by Thomas Netting.

DISCHARGE MEASUREMENTS.—Made from cable about 500 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed is shifting sand. The old Mission dam serves as part control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.5 feet at noon March 12 (discharge, 12,000 second-feet); stream dry during October and November and June to September, except for a small quantity of ground water rising to the surface at the dam.

1912–1918: Maximum stage recorded, 25.1 feet January 27, 1916 (discharge, 70,200 second-feet); stream practically dry for several months each year.

DIVERSIONS.—See Cuyamaca Water Co.'s flume near Lakeside. Water for irrigation is pumped from wells along the river above and below Lakeside.

REGULATION.—Water is stored at Cuyamaca reservoir on Boulder Creek.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve is fairly well defined throughout. Gage read usually to half-tenths once a day; frequent observations were made during the flood March 11–13. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record obtained in cooperation with Cuyamaca Water Co., Ed Fletcher, manager.

Discharge measurements of San Diego River near Santee, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 23	F. C. Ebert	3.82	0.1	11	F. C. Ebert	11.10	1,810
Jan. 4	do	3.84	.2	12	do	12.85	7,810
Feb. 7	D. A. McClung	3.84	.09	12	do	12.20	4,950
Mar. 6	F. C. Ebert	3.88	.26	13	do	10.95	1,750
9	do	3.85	.2	14	do	8.40	500
11	do	5.35	38	16	do	7.10	191
11	do	10.11	1,070	May 8	do	4.00	1.1

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Daily discharge, in second-feet, of San Diego River near Santee, Calif., for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1	.....	.....	.....	0.2	38	2	16	.....	.....	.....	201	5	.....
2	.....	.....	.....	.2	35	2	17	.....	.....	.....	138	5	.....
3	.....	.....	.....	.2	32	2	18	.....	.....	.....	117	5	.....
4	.....	0.2	.....	.2	30	2	19	.....	.....	.....	376	5	.....
5	.....	.....	.....	.2	30	1	20	.....	.....	.....	475	4	.....
6	.....	.....	.....	.3	28	1	21	.....	.....	.....	288	4	.....
7	.....	.....	0.2	.3	21	1	22	.....	.....	.....	161	4	.....
8	.....	.....	.....	.5	18	1.1	23	0.1	.....	.....	117	4	.....
9	.....	.....	.....	.2	16	.....	24	.....	.....	.....	108	4	.....
10	.....	.....	.....	.2	14	.....	25	.....	.....	.....	99	3	.....
11	.....	.....	.....	127	12	.....	26	.....	.....	.....	82	3	.....
12	.....	.....	.....	5,350	8	.....	27	.....	.....	.....	74	3	.....
13	.....	.....	.....	1,220	8	.....	28	.....	.....	.....	67	3	.....
14	.....	.....	.....	462	8	.....	29	.....	.....	.....	53	3	.....
15	.....	.....	.....	308	7	.....	30	.....	.....	.....	47	2	.....
							31	.....	.....	.....	41	.....	.....

NOTE.—No flow Oct. 1 to Nov. 30 and June 1 to Sept. 30. No gage-height record until Mar. 5 and after Apr. 16. Discharge estimated Mar. 1-5, 7, 8, and 10; interpolated Apr. 17 to May 8. December estimated as 0.1 second-foot, January and February as 0.2 second-foot, and May as 0.7 second-foot.

BOULDER CREEK NEAR JULIAN, CALIF.

LOCATION.—In Cuyamaca grant, at outlet of Cuyamaca reservoir, 7 miles south of Julian, San Diego County, and 12 miles above mouth of Boulder Creek.

DRAINAGE AREA.—12.0 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 19, 1912, to September 30, 1918.

GAGE.—Vertical staff fastened on right side of weir box, 3½ feet above weir. Zero at elevation of crest of the 6-foot Cippoletti weir which is 100 feet below outlet gates of reservoir. Gage read by watchman at dam.

DISCHARGE MEASUREMENTS.—Made by wading near weir. On account of velocity of approach, it has been necessary to rate weir.

CONTROL.—Cippoletti weir acts as permanent control.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge reported during year 24 second-feet February 5.

1912-1918: Maximum mean daily discharge recorded occurred January 28, 1916 (discharge, 1,877 second-feet). No water is released from reservoir except when needed for Cuyamaca Water Co.'s flume.

DIVERSIONS.—None.

REGULATION.—Flow completely regulated by operation of outlet gate of reservoir. Cuyamaca dam, completed in 1886, was one of the first earth dams built in California to store water for irrigation. The dam was originally 35 feet high but in 1894 was enlarged, increasing the capacity of the reservoir to 11,400 acre-feet. The present dam is 635 feet long and 41½ feet high, with an inner slope of 2:1 and an outer slope of 1½:1. From the reservoir the water flows 12½ miles down the natural channel of Boulder Creek and San Diego River to the intake of Cuyamaca Water Co.'s flume.

ACCURACY.—Stage-discharge relation permanent except when changes are made in weir. Gage read daily to hundredths; additional observations are made when reservoir gates are changed. Records excellent when discharge does not exceed capacity of weir.

COOPERATION.—Record of daily discharge furnished by Cuyamaca Water Co., Ed. Fletcher, manager.

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Daily discharge, in second-feet, of Boulder Creek near Julian, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.9	9.4	.....	2.7	.....	.....	.....	.....	.....	7.2	11.6	11.6
2	8.9	4.3	.....	2.7	7.7	.....	.....	.....	.....	7.2	11.6	7.5
3	8.9	4.3	.....	2.7	11.1	.....	.....	.....	.....	11.4	11.6	7.5
4	8.9	4.3	.....	2.7	12.6	.....	.....	.....	.....	11.4	11.6	7.5
5	8.9	4.3	.....	2.7	24	.....	.....	.....	.....	11.4	11.6	7.5
6	8.9	4.3	.....	2.5	22	.....	.....	.....	.....	11.4	11.6	7.5
7	8.9	.....	.....	1.8	19.2	.....	.....	.....	.....	11.4	11.6	7.5
8	8.9	.....	.....	1.8	21	.....	.....	.....	4.4	11.4	11.6	7.5
9	8.9	.....	.....	1.8	23	.....	.....	.....	7.2	11.4	11.6	7.5
10	8.9	2.2	.....	1.8	22	.....	.....	.....	7.2	11.4	11.6	7.5
11	8.9	3.6	.....	1.8	22	.....	.....	.....	7.2	11.4	11.6	9.2
12	8.9	3.6	.....	1.8	22	.....	.....	.....	7.2	11.4	11.6	11.6
13	4.4	3.6	.....	1.0	22	.....	.....	.....	7.2	8.9	11.6	11.6
14	6.9	3.6	.....	.....	22	.....	.....	.....	7.2	8.9	11.6	10.1
15	3.0	3.6	.....	.....	22	.....	.....	.....	7.2	8.9	11.6	10.1
16	5.3	3.6	.....	.....	22	.....	.....	.....	7.2	8.9	11.6	8.0
17	2.6	3.6	.....	.....	22	.....	.....	4.7	7.2	8.9	11.6	8.0
18	4.3	3.6	1.6	.....	14.1	.....	.....	4.7	7.2	8.9	11.6	8.0
19	4.3	3.6	1.6	.....	.....	.....	.....	4.7	7.2	8.9	11.6	8.0
20	4.3	3.6	1.6	.....	.....	.....	.....	3.9	7.2	8.9	11.6	8.0
21	4.3	3.6	1.6	.....	2.0	.....	.....	2.7	7.2	11.6	11.6	8.0
22	4.3	3.6	1.6	.....	.6	.....	.....	2.0	7.2	11.6	11.6	8.0
23	4.3	3.6	2.3	.....	.....	.....	.....	.8	7.2	11.6	11.6	8.0
24	4.3	3.6	2.3	.....	.....	.....	.....	.8	7.2	11.6	11.6	8.0
25	4.3	3.6	.9	.....	.....	.....	.....	.8	7.2	11.6	11.6	10.7
26	4.3	3.6	.9	.....	.....	.....	.....	.8	7.2	11.6	11.6	10.7
27	4.3	3.6	.9	.....	.....	.....	.....	.8	7.2	11.6	11.6	10.7
28	4.3	.....	.9	.....	.....	.....	.....	.8	7.2	11.6	11.6	10.7
29	4.3	.....	.9	.....	.....	.....	.....	.4	7.2	11.6	11.6	10.7
30	4.3	.....	.9	.....	.....	.....	.....	.....	7.2	11.6	11.6	10.7
31	4.3	.....	.9	.....	.....	.....	.....	.....	.....	11.6	11.6	.....

NOTE.—Creek dry on days for which discharge is not given.

Monthly discharge of Boulder Creek near Julian, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8.9	2.6	6.10	375
November	9.4	.0	3.14	187
December	2.3	.0	.61	37.5
January	2.7	.0	.90	55.3
February	24	.0	11.9	661
March	.0	.0	.00	.0
April	.0	.0	.00	.0
May	4.7	.0	.90	55.3
June	7.2	.0	5.43	323
July	11.6	7.2	10.6	652
August	11.6	11.6	11.6	713
September	11.6	7.5	8.93	531
The year	24	.0	4.96	3,590

CUYAMACA WATER CO.'S FLUME AT DIVERTING DAM, NEAR LAKESIDE, CALIF.

LOCATION.—In SE. ¼ sec. 11, T. 14 S., R. 2 E., just below intake, at diverting dam, 13 miles northeast of Lakeside, San Diego County.

RECORDS AVAILABLE.—June 1, 1912, to September 30, 1918.

GAGE.—Vertical staff in a stilling box on outside of flume, about 1,000 feet below intake, installed April 8, 1916. Previous gage was similar but was 500 feet below intake and just above sand box. Datum has always been elevation of floor of flume. Gage read by employees of Cuyamaca Water Co.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

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CHANNEL AND CONTROL.—The flume is lined with tar paper to reduce leakage.

EXTREMES OF DISCHARGE.—1912–1918: Maximum daily discharge 51 second-feet, March 24, 1913. No flow for certain periods nearly every year.

ACCURACY.—Stage-discharge relation permanent for years 1916–1918. Rating curve used for entire year is well defined. Gage read to hundredths three times daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Cuyamaca Water Co.'s flume, which diverts water from San Diego River and receives water from the South Fork of San Diego River, is more than 30 miles long, 6 feet wide, and 24 inches deep. It discharges into La Mesa reservoir, about 8 miles northeast of San Diego. This system supplied the city of San Diego with water until 1906, when the Southern California Mountain Water Co. extended its system to the city. The flume was again used to supply the city of San Diego after the floods of 1916, and it now supplies water for irrigation and domestic service. The Capitan Grande Indian Reservation has a water right of 0.8 second-foot from this flume.

Discharge measurements of Cuyamaca Water Co.'s flume at diverting dam, near Lakeside, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 7	D. A. McClung	0.52	4.3	Nov. 9	D. A. McClung	0.40	2.6
7	do	.89	10.5	10	do	.82	9.3
7	do	.71	7.0	Feb. 8	do	1.33	22
7	do	1.02	13.4	Mar. 7	F. C. Ebert	.92	12.2

Daily discharge, in second-feet, of Cuyamaca Water Co.'s flume at diverting dam, near Lakeside, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.5	3.7	.....	3.0	3.7	9.6	26	8.3	7.4	6.1	9.8	10.5
2	6.5	7.8	.....	3.3	4.0	7.8	26	7.6	6.8	5.6	10	9.6
3	6.6	4.6	.....	3.3	9.8	6.8	26	6.3	4.4	7.0	10	7.4
4	6.1	3.7	.....	3.4	11	6.3	26	5.7	4.0	8.7	9.3	6.5
5	6.1	3.8	.....	6.1	21	6.1	24	5.7	4.9	9.1	9.1	5.7
6	6.1	5.2	.....	3.3	23	6.1	19.5	6.3	4.3	9.3	9.8	6.3
7	6.1	7.6	.....	3.1	22	10.5	20	6.5	2.7	9.6	10.5	6.6
8	6.3	4.9	.....	3.3	23	22	18	7.2	2.4	9.6	10	6.5
9	6.3	1.5	.....	3.4	25	29	18.5	10.5	4.4	9.8	10.5	6.3
10	6.5	4.0	.....	3.6	25	29	18.5	10.5	6.5	9.6	10.5	6.3
11	6.8	3.0	.....	3.3	25	20	17.5	8.7	5.6	9.6	10	7.4
12	8.0	3.0	.....	2.9	25	13.5	18	8.0	6.6	9.6	10	8.7
13	7.6	4.3	.....	10	26	18	18.5	6.3	6.5	9.1	10	10.5
14	7.6	5.2	.....	9.3	26	14.5	19.5	6.3	5.9	8.0	10	10
15	7.8	5.0	.....	4.6	26	28	17.5	5.7	6.8	7.2	10.5	9.3
16	7.8	5.0	.....	3.1	20	28	16	6.3	7.4	7.2	12	9.6
17	7.2	5.0	.....	2.7	24	28	14	5.9	8.5	6.5	11.5	8.0
18	5.9	5.0	.....	2.6	27	28	12.5	7.2	7.4	6.5	10	6.1
19	4.4	4.4	3.0	1.8	22	26	9.1	8.3	7.6	7.4	9.8	5.6
20	3.7	3.8	6.3	1.8	12.5	15	9.6	7.8	8.3	6.5	9.8	6.1
21	3.7	3.8	5.2	2.0	10.5	25	10.5	8.0	6.8	7.6	9.8	6.3
22	3.7	4.0	4.8	2.0	23	27	12.5	8.3	7.8	8.7	9.8	7.2
23	3.7	4.9	4.6	2.0	23	28	11	9.1	7.0	9.3	9.8	8.0
24	3.7	5.2	3.6	2.0	23	25	12	7.0	7.8	9.6	9.8	9.3
25	3.7	5.4	4.0	2.0	18.5	25	11.5	6.6	7.4	9.8	9.8	9.6
26	3.7	5.6	4.3	16	20	27	10	6.6	6.8	9.8	9.8	9.8
27	3.7	5.7	3.8	17	16.5	26	9.6	6.6	6.3	9.8	9.8	9.8
28	3.7	5.6	3.1	7.0	13.5	26	8.3	7.2	6.3	9.8	10	9.8
29	3.7	6.5	3.3	5.2	.....	26	8.5	14	6.1	9.8	10.5	9.6
20	3.7	6.6	3.3	3.7	.....	26	8.7	13.5	6.5	9.6	10.5	10
31	3.7	.....	3.3	3.7	.....	26	.....	7.8	.....	9.6	10.5	.....

NOTE.—No flow Dec. 1-18. Discharge July 24 interpolated.

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Monthly discharge of Cuyamaca Water Co.'s flume at diverting dam, near Lakeside, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8.0	3.7	5.50	338
November	7.8	1.5	4.79	285
December	6.3	.0	1.70	105
January	17	1.8	4.53	279
February	27	3.7	19.6	1,090
March	29	6.1	20.6	1,270
April	26	8.3	15.9	946
May	14	5.7	7.74	476
June	8.5	2.4	6.24	371
July	9.8	5.6	8.56	526
August	12	9.1	10.1	621
September	10.5	5.6	8.08	481
The year	29	.0	9.37	6,790

CUYAMACA WATER CO.'S FLUME NEAR LAKESIDE, CALIF.

LOCATION.—At patrolman's cabin half a mile above trestle crossing at Los Coches Creek, 3 miles southeast of Lakeside, San Diego County, and 20 miles below intake on San Diego River.

RECORDS AVAILABLE.—January 1, 1907, to September 30, 1918.

GAGE.—Vertical staff in a stilling box fastened to outside of flume just below patrolman's cabin at same site as water-stage recorder used in previous years. Position of gage has been changed slightly several times since station was first established, but datum has always been same as elevation of floor of flume. Gage read by an employee of Cuyamaca Water Co.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume near gage.

CHANNEL AND CONTROL.—In the fall of 1914 the flume was deepened 8 inches and more tar-paper lining was put in. Capacity of flume slightly increased as a result of repairs made December 1–19, 1917.

EXTREMES OF DISCHARGE.—1907–1918: Maximum mean daily discharge, 25 second-feet, February 16, 1918. No flow certain periods every year.

ACCURACY.—Stage-discharge relation not permanent throughout the year. Flume repaired December 1–19, 1917, and resulted in a change in rating. Two fairly well defined rating curves were used during the year. Gage read to hundredths three times daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

There is a small diversion from this flume at Capitan Grande Indian Reservation above the station. Water is also diverted into the flume from South Fork of San Diego River. For location of intake, description of flume, and explanation of the use of the water, see description of Cuyamaca Water Co.'s flume at diverting dam near Lakeside (p. 20).

Discharge measurements of Cuyamaca Water Co.'s flume near Lakeside, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 7	D. A. McClung	0.80	7.6	Feb. 7	D. A. McClung	1.33	22
8	do	1.01	11.9	Mar. 9	F. C. Ebert		23
9	do	.54	3.4	May 7	do	.82	9.1
10	do	.52	2.8	Aug. 22	do	.80	9.0
11	do	.59	3.7	Sept. 7	D. A. McClung	.61	4.8
Dec. 22	F. C. Ebert		6.4				

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Daily discharge, in second-feet, of Cuyamaca Water Co.'s flume near Lakeside, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.9	3.7	.....	3.9	5.9	12.5	22	12	7.6	5.5	7.2	8.6
2	5.9	6.6	.....	3.4	5.0	10	22	11.5	7.4	5.5	7.8	8.4
3	5.9	6.6	.....	3.9	10	9.3	22	11	5.3	7.2	8.0	6.4
4	5.7	5.9	.....	3.8	11.5	8.8	22	9.5	4.4	6.8	8.0	5.2
5	5.7	3.9	.....	3.9	19	8.2	22	9.5	4.6	8.0	7.6	4.6
6	5.7	5.7	.....	4.4	[illegible]	8.2	19	9.7	5.3	8.4	7.0	4.6
7	5.7	5.7	.....	3.9	22	10.5	20	8.8	4.0	7.6	7.6	4.6
8	5.4	12	.....	4.0	22	22	20	8.8	3.4	8.0	7.6	4.8
9	5.7	3.9	.....	3.9	23	22	17.5	13.5	3.6	8.0	7.9	4.6
10	5.5	3.9	.....	4.0	24	23	19	15	6.2	8.0	8.2	4.0
11	5.7	4.8	.....	4.0	24	19	19	13	4.6	8.0	7.8	4.8
12	6.1	4.6	.....	2.6	24	12	19.5	12	5.0	8.6	7.6	6.1
13	6.4	4.8	.....	5.2	24	12	20	9.3	5.3	8.2	8.2	7.0
14	6.1	5.4	.....	11	24	22	21	8.4	5.0	7.8	8.4	8.0
15	6.3	3.2	.....	5.5	24	18	19	7.8	6.1	6.4	9.0	6.8
16	7.8	5.2	.....	2.4	25	6.1	17.5	8.2	6.4	6.4	9.7	6.8
17	7.6	4.4	.....	2.4	24	20	15.5	8.0	7.6	6.1	9.3	6.1
18	3.6	5.2	.....	3.0	25	20	13	8.8	6.2	5.5	8.2	5.3
19	3.6	5.2	.....	2.8	23	22	11	9.7	7.0	5.5	8.2	5.0
20	3.0	4.8	6.8	2.2	16	2.9	9.3	9.9	7.6	5.3	8.4	5.2
21	3.5	5.0	6.6	3.6	12.5	20	8.6	8.6	6.8	5.3	8.6	5.0
22	3.5	5.0	6.4	3.3	20	22	6.6	8.4	5.9	6.1	8.2	5.3
23	3.5	5.2	4.2	4.0	24	23	11.5	7.0	5.7	7.4	8.2	6.1
24	3.6	5.7	4.5	3.2	23	21	13	6.6	5.9	7.4	8.2	6.1
25	3.2	5.7	4.4	4.0	19.5	21	13	6.8	6.4	7.0	7.4	6.4
26	3.6	6.1	4.2	14	22	22	12	6.8	6.6	7.8	8.8	6.8
27	3.6	5.9	4.0	16.5	19.5	22	12.5	6.4	6.8	8.0	8.2	7.0
28	3.6	5.7	4.2	10.5	16.5	22	12.5	6.4	5.7	8.0	8.8	6.8
29	3.7	5.4	4.2	7.2	.....	22	15.5	9.9	5.7	7.0	8.2	6.2
30	3.9	5.4	4.2	5.9	.....	22	11.5	14	5.5	7.2	8.8	6.2
31	3.6	.....	4.2	5.9	.....	22	.....	8.8	.....	7.4	8.6	.....

NOTE.—Flume being repaired, no flow Dec. 1-19.

Monthly discharge of Cuyamaca Water Co.'s flume near Lakeside, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	7.8	3.0	4.92	303
November	12	3.2	5.35	318
December	6.8	.0	1.87	115
January	16.5	2.2	5.11	314
February	25	5.0	19.8	1,100
March	23	2.9	17.0	1,050
April	22	6.6	16.2	964
May	15	6.4	9.49	584
June	7.6	3.4	5.79	345
July	8.6	5.3	7.08	435
August	9.7	7.0	8.18	503
September	8.6	4.0	5.96	355
The year	25	.0	8.82	6,390

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SAN DIEGUITO RIVER BASIN.

SANTA YSABEL CREEK NEAR MESA GRANDE, CALIF.

LOCATION.—In NW. ¼ sec. 21, T. 12 S., R. 2 E., at Sutherland dam site, 1 mile below Sutherland, 1½ miles above mouth of Black Canyon Creek, and 4½ miles southwest of Mesa Grande, San Diego County.

DRAINAGE AREA.—53.4 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 29, 1912, to September 30, 1918.

GAGE.—Friez water-stage recorder on right bank just above Sutherland dam site. Gage datum was lowered 0.21 foot on October 12, 1916, on account of change in control. Previous gages have been at same location but original datum has not been maintained.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Bed is shifting sand. A concrete control constructed at an outcropping of bedrock 20 feet below gage was repaired November 6–9, 1916. Banks are high, covered with brush, and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.75 feet at 8 a. m. March 12 (discharge, 1,390 second-feet); minimum stage from water-stage recorder, 0.87 foot at 7 p. m. July 30 (discharge, 0.1 second-foot).

1912–1918: Maximum stage recorded, 11.0 feet January 27, 1916 (discharge, 21,100 second-feet); stream dry October 1–2, 1913; August 12–29; and September 6–13, 1914.

DIVERSIONS.—No large diversions above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly by the high water on March 12. Rating curves are fairly well defined below 600 second-feet. The operation of the water-stage recorder was satisfactory except October 7–12 and June 8–14, when staff gage readings were used. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting gage-height graph, except on March 7, 10–13, and 19, when hourly discharges were averaged. Records fair.

Discharge measurements of Santa Ysabel Creek near Mesa Grande, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	D. A. McClung	1.10	0.6	Mar. 14	F. C. Ebert	1.87	79
Nov. 19	do	1.20	1.4	31	D. A. McClung	1.42	19
Dec. 9	do	1.22	1.9	May 6	F. C. Ebert	1.34	12
24	do	1.23	2.8	Aug. 13	D. A. McClung	1.15	1.6
31	F. C. Ebert	1.22	2.8	30	do	1.12	.4
Mar. 8	do	1.68	35				

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[illegible] *Mono Grande, Calif., for the* [illegible] *1918.*

| [illegible] | [illegible] | [illegible] |

SANTA YSABEL CREEK NEAR RAMONA, CALIF.

LOCATION.—In NE. ¼ NE. ¼ sec. 27, T. 12 S., R. 1 E., at Pamo dam site, at lower end of Pamo Valley, 1½ miles below mouth of Temescal Creek and 4½ miles north of Ramona, San Diego County.

DRAINAGE AREA.—110 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 5, 1912, to September 30, 1918.

GAGE.—Leitz water-stage recorder, on left bank at dam site was in operation from November 3 to December 1, 1917; vertical staff fastened to outside of gage well, known as gage "C" was used during remainder of year. Gage read by C. M. DeVenelle. Original gage was a staff in four sections on left bank, one-half mile upstream, with a short vertical section at concrete control.

DISCHARGE MEASUREMENTS.—Made from cable about 1,000 feet above gage or by wading.

CHANNEL AND CONTROL.—Shifting sand banks are high and clean; channel straight for 200 feet above and 600 feet below gage. Concrete control built across channel just below gage, was completed December 8, 1916, and was destroyed by the high water on March 12, 1918.

EXTREMES OF DISCHARGE.—Maximum stage during year, 9.1 feet at 9.30 a. m. March 12 (approximate discharge estimated from Mesa Grande record, 2,500 second-feet); minimum stage August 25–26 (discharge, 0.2 second-foot).

1912–1918: Maximum stage recorded, 14.0 feet January 27, 1916 (discharge, 28,400 second-feet); minimum stage, 0.74 foot October 1–6, 1915 (discharge, 0.1 second-foot).

DIVERSIONS.—No large diversions above the station. Water is diverted from Santa Ysabel Creek near the mouth of the canyon, 5 miles below the station, by East San Pasqual ditch, which takes out on the left bank, and West San Pasqual ditch, which takes out on the right bank and below the intake of the East San Pasqual.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent throughout the year. Staff gage read to hundredths twice daily. Fairly well-defined rating curves used October 1 to December 24; December 25 to March 10; March 26 to August 17; August 18–31; and September 1–30. Daily discharge for these periods ascertained by applying mean daily gage height to rating table. Mean daily gage height from water-stage recorder sheets determined by inspecting recorder graph. Discharge March 12–13 and 15–25 estimated from Mesa Grande record. Records fair for periods covered by rating curves; those for other periods roughly approximate.

Discharge measurements of Santa Ysabel Creek near Ramona, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 4	T. P. Ellis	1.25	1.3	Mar. 14	F. C. Ebert	2.38	131
Nov. 19	McClung and DeVenelle	1.34	2.5	Apr. 1	D. A. McClung	2.65	32
Dec. 23	D. A. McClung	1.47	4.5	May 5	F. C. Ebert	2.41	15
31	F. C. Ebert	1.48	6.4	Aug. 12	D. A. McClung	2.08	1.2
Mar. 8	do	2.16	104	29	do	2.10	.5

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Daily discharge, in second-feet, of Santa Ysabel Creek near Ramona, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.5	2.2	4.7	6	12	14	31	12	3.6	1.8	0.9	1.8
2	1.4	2.2	4.4	6	11	13	32	12	3.3	1.5	1.0	1.5
3	1.4	2.0	4.7	6	10	11	32	12	3.3	1.8	1.0	1.1
4	1.4	2.3	4.2	6	9.5	9.5	30	12	2.7	2.1	1.1	1.0
5	1.4	2.4	4.2	6.5	9.5	9	28	12	2.4	1.8	1.3	.9
6	1.4	5.5	4.4	6	8.5	13	27	12	2.1	2.1	1.5	.8
7	1.4	19	5.0	6	9.5	128	27	12	2.1	2.1	2.4	1.0
8	1.6	13	4.4	6	9.5	121	25	12	1.8	1.8	3.6	1.1
9	1.4	8	4.0	6	9	22	22	16	1.5	1.5	1.3	1.1
10	2.0	5.5	4.7	6.5	7.5	14	23	14	1.3	1.5	1.1	1.1
11	1.8	5.5	4.7	6.5	7	580	23	13	1.1	1.1	1.3	.9
12	2.9	5.5	5.0	6.5	7.5	1,300	23	12	1.0	1.0	1.1	.8
13	3.0	5.5	5.0	54	8	420	25	12	1.1	1.0	1.3	.8
14	3.7	5.5	5.5	17	8.5	131	23	12	1.8	1.1	1.1	.8
15	5.0	5.5	5.5	10	8.5	90	21	10	2.7	1.1	1.5	1.3
16	5.5	5.5	5.0	10	9	60	20	9	2.4	1.0	1.8	1.8
17	4.7	5.0	5.0	9	9.5	55	18	7.5	2.1	1.1	2.7	1.8
18	4.0	4.0	5.0	8.5	50	50	16	6.5	1.8	1.3	1.8	2.1
19	2.3	2.6	5.0	7.5	29	140	13	6	2.1	1.5	2.2	1.3
20	2.2	2.3	5.5	7	22	185	13	6	2.4	1.8	1.5	1.1
21	2.2	2.6	5.0	7.5	17	90	20	5.5	2.4	1.5	.9	.8
22	2.2	2.9	4.7	7	60	75	18	4.6	2.4	1.8	.4	.7
23	2.3	4.4	4.7	6	31	70	18	5	2.4	1.5	.4	.5
24	2.4	5.0	4.7	7	20	65	15	4.6	2.7	1.5	.4	.9
25	2.6	5.0	5.5	15	22	50	15	4 6	3.0	1.5	.2	1.1
26	2.8	5.0	6.0	48	20	42	14	5	3.3	1.3	.2	1.1
27	2.6	5.0	6.0	31	17	41	15	4.6	3.6	1.1	1.2	1.1
28	2.4	5.0	6.0	18	15	43	13	6.5	3.0	1.1	.5	1.1
29	2.6	5.0	6.0	12	.....	42	14	33	2.4	1 1	.4	1.0
30	2.6	5.0	6.0	12	.....	34	12	12	1.8	.9	.7	1.0
31	2.2	.....	6.5	12	.....	32	.....	4.2	.....	.8	1.8	.....

Monthly discharge of Santa Ysabel Creek near Ramona, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	5.5	1.4	2.48	152
November	19	2.0	5.13	305
December	6.5	4.0	5.06	311
January	54	6	12.0	738
February	50	7	16.3	905
March	1,300	9	127	7,810
April	32	12	20.9	1,240
May	33	4.2	9.99	614
June	3.6	1.0	2.32	138
July	2.1	.8	1.42	87.3
August	3.6	.2	1.25	76.9
September	2.1	.5	1.11	66.0
The year	1,300	.2	17.2	12,400

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SAN DIEGUITO RIVER NEAR BERNARDO, CALIF.

LOCATION.—In SE. ¼ NW. ¼ sec. 18, T. 13 S., R. 2 W., at Carroll dam site, 5½ miles below Bernardo Bridge, about 10½ miles above mouth of river, and 4 miles southwest of Bernardo, San Diego County.

DRAINAGE AREA.—299 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 17, 1916, to September 30, 1918.

GAGE.—Vertical staff in four sections on right bank at dam site. Zero of gage 214 feet above sea level. Gage read by F. E. Green.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading near gage.

CHANNEL AND CONTROL.—Shifting sand; bedrock outcrops about 400 feet below gage; fairly permanent except during low stages.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge 4,000 second-feet March 11; stream dry during the periods October 1 to November 8 and June 10 to September 30.

1916–1918: Maximum stage recorded, 21.2 feet 1 to 3 p. m. January 27, 1916 (discharge, 72,100 second-feet); no flow July 30 to September 30, 1916, June 30 to November 8, 1917, and June 10 to September 30, 1918.

DIVERSIONS.—East and west San Pasqual ditches divert water for irrigation from the Santa Ysabel at the upper end of San Pasqual Valley (see Santa Ysabel Creek near Ramona). Water for irrigation is also pumped from wells along the river.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent except for short periods during year. Construction of Lake Hodges dam interfered with maintenance of station and several rating curves were used. Gage read to hundredths twice daily, more frequently during high water. Daily discharge ascertained by applying gage height to rating table.

COOPERATION.—Daily discharge record furnished for publication by San Dieguito Mutual Water Co., through Ed Fletcher, president.

Discharge measurements of San Dieguito River near Bernardo, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 9	F. E. Green		0.0	Mar. 9	F. E. Green	1.31	72
17	D. A. McClung		.1	11	do		4,500
Dec. 25	do		.2	12	do		3,150
Jan. 25	F. E. Green		5.7	13	do		1,380
25	do		6.7	13	do		720
26	do		46	14	do	1.70	325
27	do	0.54	34	15	do	1.30	168
31	do	.01	13	19	do	.30	101
Feb. 4	do	−.12	8.3	21	do	.88	175
7	do	−.09	11	25	do	.30	96
11	do	−.34	3.5	29	do	.08	68
14	do	−.24	7.0	Apr. 2	do	7.80	57
18	do	.62	74	8	do	7.76	45
21	do	.05	24	12	do	7.72	30
23	do	.57	74	17	do		28
25	do	.42	34	20	do		6.9
Mar. 1	do	.08	15	26	do		5.0
4	do	.06	12	May 16	do		1.0
7	do	.37	39	June 22	D. A. McClung		2
8	do		279				

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Daily discharge, in second-feet, of San Dieguito River near Bernardo, Calif., for the year ending Sept. 30, 1918.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	11	16	56	5	2	16	.....	3	140	28	1	.....
2	.....	10	15	56	5	1	17	.....	3	110	28	1	.....
3	.....	9	14	56	4	1	18	.....	84	90	20	1	.....
4	.....	8	13	56	4	1	19	.....	58	101	15	1	.....
5	.....	9	11	51	4	.8	20	.....	29	200	7	1	.....
6	.....	9	20	48	3	.5	21	.....	17	175	7	1	.....
7	.....	10	40	45	3	.3	22	.....	69	140	6	1	.....
8	.....	8	270	45	3	.2	23	.....	68	120	6	1	.....
9	.....	4	72	38	3	.1	24	.....	30	104	6	.8	.....
10	.....	3	62	36	3	.....	25	7	34	97	5	.7	.....
11	.....	3	4,000	33	2	.....	26	47	28	90	5	.6	.....
12	.....	4	3,300	30	2	.....	27	21	15	80	5	.5	.....
13	.....	5	1,300	30	2	.....	28	15	10	70	5	.4	.....
14	.....	8	325	29	2	.....	29	13	.....	50	5	25	.....
15	.....	4	165	29	1	.....	30	12	.....	50	5	20	.....
							31	12	.....	50	.....	5	.....

NOTE.—No flow Oct. 1 to Nov. 8 and June 10 to Sept. 30. Mean flow for November estimated as 0.1 second-foot; December as 0.15 second-foot, and Jan. 1-24 as 0.2 second-foot.

Monthly discharge of San Dieguito River near Bernardo, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 299 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
November	.....	.....	[a] 0.10	.....	0.00	6.0
December	.....	.....	[a] .15	0.00050	.001	9.2
January	47	.....	4.25	.014	.02	261
February	84	3	19.8	.066	.07	1,100
March	4,000	11	364	1.22	1.41	22,400
April	56	5	26.4	.088	.10	1,570
May	25	.4	3.45	.012	.01	212
June	2	.0	.23	.00077	.001	13.7
The year	4,000	.0	35.3	.118	1.612	25,600

[a] Estimated.

BLACK CANYON CREEK NEAR MESA GRANDE, CALIF.

LOCATION.—In NE. ¼ sec. 17, T. 12 S., R. 2 E., 1 mile above junction with Santa Ysabel Creek and 4 miles southwest of Mesa Grande, San Diego County.

DRAINAGE AREA.—15.2 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 14, 1913, to September 30, 1918 (discharge measurements only except for 1913-14, January to March, 1917, and 1917-18).

GAGE.—Inclined staff on left bank.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Solid rock and boulders; appears permanent.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 25 second-feet. Gage read occasionally to hundredths. Daily discharge ascertained by applying gage height to rating table. High-water record roughly approximate; other records fair.

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Discharge measurements of Black Canyon Creek near Mesa Grande, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 19	D. A. McClung	0.70	0.2	Mar. 31	D. A. McClung	1.20	4.8
Dec. 24	do	.74	.4	May 6	F. C. Ebert	.96	1.6
31	F. C. Ebert		.6	Aug. 13	D. A. McClung	.62	.05
Mar. 8	do		14				

Daily discharge, in second-feet, of Black Canyon Creek near Mesa Grande, Calif., for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		0.2		0.8	1.6	6					
2									0.2		
3							2.8				
4			0.2					2.2			
5	0.5				1.6	4.2			.2	0.0	
6				.5							0.1
7	.8				4.2		2.8	1.6			
8		.2			28				6		
9						4.2	2.8			.1	
10	.2								.2		
11			.3		517			1.1			
12				.5	540	2.8			.2		
13			6		42					.1	
14			1.1				2.8	.6			.1
15				.6							
16		.3			9	3.5			.2	.2	
17	.2						2.2				
18				6	8			.6			
19						2.8			.1		
20				1.1	30		2.8			.1	.1
21			.5					.4			
22		.3			12						
23						3.2			.1	.1	
24	.2						2.2				
25			4.2	4.2				.3			
26					8	3.5			.1		
27			2.8				2.2			.1	.1
28		.2						.2			
29					7		7		.2		
30			.6			3.2					
31							2.2			.1	

SANTA MARIA CREEK NEAR RAMONA, CALIF.

LOCATION.—In SE. ¼ sec. 11, T. 13 S., R. 1 W., 7 miles below mouth of Hatfield Creek and 5½ miles west of Ramona, San Diego County.

DRAINAGE AREA.—57.3 square miles (measured on topographic map).

RECORDS AVAILABLE.—November 6, 1912, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank just above control. Original datum has been maintained.

DISCHARGE MEASUREMENTS.—Made from cable 370 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed is shifting sand. Concrete control just below gage at an outcropping of solid rock was rebuilt during summer of 1916. Zero flow occurs at about 1.70 feet on gage. Left bank is high; right bank sloping; one channel all stages. About 1,000 feet below gage valley narrows to a rocky gorge at proposed dam site. On this account there is natural storage in the channel during extreme high water.

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EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.0 feet at 5 a. m. March 12 (discharge, 1,370 second-feet); stream dry October to December and June to September, except for a very small quantity of ground water brought to the surface at the concrete control.

1912–1918: Maximum stage recorded, 15.9 feet at 5 p. m. January 27, 1916 (discharge, 7,140 second-feet); stream practically dry for several months each year.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of the water-stage recorder satisfactory except March 12–15 when intake to well was closed by sand deposited by high water on March 12. Discharge for this period estimated by comparison with flow of Santa Ysabel Creek near Mesa Grande. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recordergraph, except March 8, 11, and 19, when hourly discharge was averaged. Records good.

The following discharge measurement was made by F. C. Ebert:

March 8, 1918: Gage height, 2.09 feet; discharge, 4.7 second-feet.

Daily discharge, in second-feet, of Santa Maria Creek near Ramona, Calif., for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	0.05	0.1	0.1	2.4	0.1	0.1
2	.....	.05	.05	.1	2.6	.1	.....
3	.....	.05	.05	.1	3.2	.1	.....
4	.....	.05	.05	.1	2.6	.1	.....
5	.....	.1	.05	.1	1.9	.1	.....
6	.....	.1	.05	.1	2.4	.1	.....
7	.....	.1	.05	.4	1.7	.1	.....
8	.....	.1	.05	8.5	1.2	.1	.....
9	.....	.1	.05	.2	1.1	.1	.....
10	.....	.1	.05	.4	1.2	.1	.....
11	.....	.1	.05	131	1.2	.1	.....
12	.....	.1	.05	670	1.3	.1	.....
13	.....	.2	.05	110	1.6	.1	.....
14	.....	.2	.05	25	1.6	.1	.....
15	.....	.2	.05	15	1.3	.1	.....
16	.....	.1	.05	8.5	.8	.1	.....
17	.....	.1	.1	6	.6	.1	.....
18	.....	.1	.3	4.8	.3	.1	.....
19	.....	.1	.1	101	.2	.1	.....
20	.....	.1	.1	72	.1	.1	.....
21	.....	.1	.1	21	.1	.1	.....
22	.....	.1	.3	12	.1	.1	.....
23	.....	.1	.2	8.5	.1	.1	.....
24	0.05	.1	.1	7.5	.1	.1	.....
25	.05	.1	.1	7	.1	.1	.....
26	.05	.2	.1	6	.1	.1	.....
27	.05	.2	.1	5.5	.1	.1	.....
28	.05	.2	.1	4.8	.1	.1	.....
29	.05	.1	.....	3.9	.1	.1	.....
30	.05	.1	.....	3.4	.1	.1	.....
31	.05	.1	.....	2.9	.....	.1	.....

NOTE.—Stream practically dry Oct. 1 to Dec. 23, and June 2 to Sept. 30. No gage-height record Mar. 12–15; discharge estimated.

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Monthly discharge of Santa Maria Creek near Ramona, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December	.....	.....	[a] 0.05	3.1
January	0.2	0.05	.113	6.9
February	.3	.05	.091	5.1
March	670	.1	39.9	2,450
April	3.2	.1	1.01	60.1
May	.1	.1	.10	6.1
June	.....	.....	[a] .05	3.0
The year	670	.0	3.50	2,530

[a] Estimated.

SAN LUIS REY RIVER BASIN.

SAN LUIS REY RIVER NEAR MESA GRANDE, CALIF.

LOCATION.—In NW. ¼ NE. ¼ sec. 9, T. 11 S., R. 2 E., 1 mile below Warner dam site, 1 mile below mouth of Carrizo Creek, and 5 miles north of Mesa Grande, San Diego County.

DRAINAGE AREA.—209 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 3, 1911, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank at same location as previous gage. Staff gage was read October 1-12. Before June 13, 1912, gage was just above cut-off wall at dam site. Original datum has not been maintained.

DISCHARGE MEASUREMENTS.—Made from cable about 1 mile above gage or by wading.

CHANNEL AND CONTROL.—Sand and gravel; shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 10.15 feet at 6 a. m. March 12 (discharge, 7,950 second-feet); minimum stage September 7 (discharge, 1.6 second-feet).

1911-1918: Maximum stage recorded, 18.0 feet January 27, 1916 (discharge, 58,600 second-feet); minimum stage recorded, 0.09 foot August 31, 1914 (discharge, 0.2 second-foot).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changes at intervals of a few days. Mean daily gage height determined by inspecting gage-height graph. Daily discharge read from rating curve covering short periods and by interpolation between frequent discharge measurements. Records fair.

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Discharge measurements of San Luis Rey River near Mesa Grande, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	A. R. Miller	2.60	2.8	Mar. 21	A. R. Miller	3.46	158
13	do	2.63	3.6	30	do	3.18	40
20	do	2.46	2.4	Apr. 6	do	3.02	37
27	do	2.60	2.6	14	do	3.04	28
Nov. 3	do	2.56	2.8	20	do	2.90	19
7	do	2.86	12	27	do	2.90	20
17	do	2.75	4.0	May 4	do	2.88	14
24	do	2.85	4.6	7	F. C. Ebert	2.85	13
Dec. 1	do	2.83	6.2	11	A. R. Miller	2.88	20
8	do	2.83	4.2	18	do	2.82	11
15	do	2.89	8.8	25	do	2.80	9.6
22	do	2.89	8.0	June 1	do	2.84	12
24	F. C. Ebert	2.89	7.8	8	do	2.68	6.2
29	A. R. Miller	2.88	7.4	15	do	2.82	4.7
Jan. 5	do	2.90	10	22	do	2.78	5.1
12	do	2.91	11	29	do	2.84	2.9
13	do	3.30	67	July 6	do	2.83	2.3
19	do	3.00	11	13	do	2.84	2.2
26	do	3.26	52	20	do	2.81	2.0
27	do	3.10	31	27	do	2.83	2.0
Feb. 2	do	2.93	9.4	Aug. 3	do	2.83	2.1
9	do	2.85	5.8	10	do	2.81	2.7
16	do	2.87	8.1	14	McClung and Miller	2.83	1.9
18	do	3.54	178	17	A. R. Miller	2.84	2.2
22	do	3.80	246	24	do	2.84	1.7
Mar. 2	do	2.95	13	31	do	2.90	3.0
7	do	3.38	111	Sept. 7	do	2.82	1.6
7	do	3.54	250	14	do	2.83	2.3
8	do	3.78	278	21	do	2.84	2.9
11	do	6.15	2,070	28	do	2.84	2.2
12	do	9.32	6,590				

Daily discharge, in second-feet, of San Luis Rey River near Mesa Grande, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.5	2.7	6.0	8.0	9.0	14	20	17	12	2.8	2.1	2.8
2	2.5	2.8	6	9	9	13	48	16	11	2.7	2.1	2.6
3	2.5	2.8	5.5	9	8	12	51	15	10	2.6	2.1	2.4
4	2.5	5.5	5	9	7	11	40	14	9	2.5	2.1	2.2
5	2.0	6	5	9	9	10	37	14	8	2.4	2.2	2.0
6	2.8	7	4.5	9	9	58	37	13	7.5	2.3	2.3	1.8
7	2.5	8	4.5	9	9	340	36	13	7	2.3	2.4	1.6
8	2.5	8	4.2	10	9	284	34	15	6.5	2.3	2.5	1.7
9	2.5	7.5	4.5	10	6	133	31	17	6.5	2.3	2.6	1.8
10	2.5	7	5	9	9	210	29	19	6	2.2	2.7	1.9
11	2.5	6.5	5.5	9	5	1,080	28	20	5.5	2.2	2.5	2.0
12	2.5	6.5	6	11	7	4,030	34	16	5.5	2.2	2.3	2.1
13	3.6	6	7	43	8	830	28	17	5	2.2	2.1	2.2
14	3.5	5.5	8	10	8	183	28	18	4.9	2.2	1.9	2.3
15	3.3	5.5	8.5	8	8	139	26	19	4.7	2.2	2.0	2.4
16	3.1	5	8.5	9	8	110	24	20	13	2.1	2.1	2.5
17	2.9	5	8.5	8	8	100	23	15	5	2.1	2.2	2.6
18	2.7	4.9	8.5	7	132	94	21	11	4	2.0	2.2	2.7
19	2.5	4.9	8	8	96	300	20	11	29	2.0	2.1	2.8
20	2.4	4.8	8	7	73	320	19	10	19	2.0	2.0	2.9
21	2.4	4.8	8	5	66	160	15	9	6	2.0	1.9	2.9
22	2.5	4.7	8	4.0	153	115	14	10	5	2.0	1.8	2.8
23	2.5	4.7	8	4.0	36	78	15	10	6	2.0	1.7	2.7
24	2.5	4.6	8	4.0	17	74	17	10	9	2.0	1.7	2.6
25	2.6	4.8	8	27	17	60	19	8.5	10	2.0	1.9	2.5
26	2.6	5	8	55	18	54	20	8.5	5	2.0	2.1	2.4
27	2.6	5	7.5	30	17	46	20	8.5	4.0	2.0	2.3	2.3
28	2.6	5.5	7.5	15	14	46	20	14	3.5	2.0	2.4	2.2
29	2.6	5.5	7.5	12	.....	43	19	22	2.9	2.0	2.6	2.2
30	2.7	6	7.5	11	.....	40	18	18	2.9	2.0	2.8	2.2
31	2.7	.....	8	10	.....	32	.....	16	.....	2.0	3.0	.....

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Monthly discharge of San Luis Rey River near Mesa Grande, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	3.6	2.0	2.65	163
November	8	2.7	5.42	323
December	8.5	4.2	6.86	422
January	55	4.0	12.5	769
February	153	5	27.5	1,530
March	4,030	10	291	17,900
April	51	14	26.4	1,570
May	22	8.5	14.3	879
June	29	2.9	7.78	463
July	2.8	2.0	2.18	134
August	3.0	1.7	2.22	137
September	2.9	1.6	2.34	139
The year	4,030	1.6	33.7	24,400

SAN LUIS REY RIVER NEAR BONSALL, CALIF.

LOCATION.—In SW. ¼ sec. 31, T. 10 S., R. 3 W., near junction of Escondido highway with Oceanside-Bonsall road, 2 miles southwest of Bonsall, and 7 miles northeast of Oceanside, San Diego County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 26, 1916, to September 30, 1918. (Gage heights and discharge measurements only.)

GAGE.—Staff in three sections on left bank 200 feet northwest of junction of highways. Zero of gage 122.82 feet above sea level. January 3, 1918, a new staff gage was installed on left bank 200 feet below this gage and at an independent datum. Read by J. E. Clancy. Previous to August 9, 1916, datum was 0.9 foot lower.

DISCHARGE MEASUREMENTS.—Made by wading near gage at low and medium stages. High-water measurements made from highway bridge at Bonsall.

CHANNEL AND CONTROL.—Shifting sand.

DIVERSIONS.—The Escondido Mutual Water Co. diverts from San Luis Rey River about 14 miles above Pala. This water, which is stored in the Escondido reservoir (capacity, 3,120 acre-feet) about 6 miles northeast of Escondido, is used for irrigation and municipal supply at Escondido and vicinity. Water is also diverted for irrigation on the Rincon Indian Reservation. Water from Pauma Creek is used for irrigation on Pauma Indian Reservation and Pauma Rancho. Morena ditch and Pala Indian Reservation canal divert water in the vicinity of Pala for irrigation. Water for irrigation is also pumped from wells along the river.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Daily discharges not computed as there are not sufficient discharge measurements to define the numerous changes in channel. Gage read to hundredths once daily.

Discharge measurements of San Luis Rey River near Bonsall, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 16	D. A. McClung	1.12	12	Mar. 5	F. C. Ebert	.60	27
26	do	1.20	14	Apr. 23	D. A. McClung	.69	15
Dec. 21	F. C. Ebert	1.23	16	May 5	F. C. Ebert	.58	13
Jan. 2	D. A. McClung	.85	15	June 22	D. A. McClung		2
Feb. 20	do	.84	40				

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Daily gage height, in feet, of San Luis Rey River near Bonsall, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1.0	1.2	1.23	.90	.64	.78	.52	.52	.40	.....	.....
2	.....	1.01	1.2	1.23	.90	.58	.76	.54	.46	.38	.....	.....
3	.....	1.0	1.21	.96	.92	.56	.78	.52	.42	.36	.....	.....
4	.....	1.01	1.2	.98	.90	.64	.80	.50	.44	.36	.....	.....
5	.....	1.0	1.18	.88	.90	.60	.76	.54	.38	.34	.....	.....
6	.....	1.2	1.19	.88	.92	.70	.70	.54	.40	.32	.....	.....
7	.....	1.13	1.2	.87	.92	.92	.76	.56	.42	.32	.....	.....
8	.....	1.12	1.2	.87	.91	1.52	.72	.70	.40	.30	.....	.....
9	.....	1.08	1.16	.85	.88	1.0	.80	.68	.40	.30	.....	.....
10	.....	1.09	1.17	.84	.86	.96	.78	.65	.39	.30	.....	.....
11	.....	1.07	1.18	.88	.76	2.0	.74	.58	.40	.30	.....	.....
12	.....	1.1	1.19	.90	.76	2.77	.78	.56	.40	.30	.....	.....
13	.....	1.09	1.23	1.16	.75	1.75	.78	.54	.38	.28	.....	.....
14	.....	1.12	1.26	1.0	.72	1.23	.75	.52	.36	.36	.....	.....
15	.94	1.11	1.28	.96	.78	1.1	.68	.48	.32	.34	.....	.....
16	.94	1.14	1.28	.93	.80	.98	.67	.46	.34	.34	.....	.....
17	.94	1.1	1.27	.89	.84	.92	.70	.46	.60	.32	.....	.....
18	.96	1.1	1.25	.90	1.18	.82	.68	.46	.58	.30	.....	.....
19	.96	1.16	1.25	.87	1.08	.74	.64	.45	.58	.30	.....	.....
20	.98	1.09	1.23	.91	.86	1.32	.66	.44	.56	.30	.....	.....
21	.98	1.1	1.22	.94	1.0	1.1	.64	.44	.54	.32	.....	.....
22	.97	1.14	1.24	.92	1.14	.96	.70	.42	.56	.30	.....	.....
23	.98	1.13	1.22	.93	1.28	.74	.72	.44	.54	.28	.....	.....
24	.98	1.2	1.22	.94	.98	.92	.72	.43	.54	.28	.....	.....
25	1.0	1.2	1.21	1.04	.76	.92	.68	.42	.52	.28	.....	.....
26	1.0	1.18	1.25	1.14	.76	.94	.70	.44	.50	.28	.....	.....
27	1.0	1.2	1.26	1.0	.74	.92	.66	.50	.46	.26	.....	.....
28	1.0	1.21	1.22	.98	.70	.92	.72	.40	.40	.....	.....	.....
29	.98	1.22	1.23	.90	.....	.86	.64	.56	.36	.....	.....	.....
30	1.0	1.2	1.22	.84	.....	.82	.58	.64	.52	.....	.....	.....
31	1.01	.....	1.23	.85	.....	.84	.....	.58	.....	.....	.....	.....

NOTE.—Stream dry Oct. 1-14 and July 28 to Sept. 30.

ESCONDIDO MUTUAL WATER CO.'S CANAL NEAR NELLIE, CALIF.

LOCATION.—In SW. ¼ NW. ¼ sec. 33, T. 10 S., R. 1 E., 500 feet below intake on San Luis Rey River, 3½ miles above Rincon Indian Reservation, 5 miles southwest of Nellie, San Diego County, and 15 miles northeast of Escondido.

RECORDS AVAILABLE.—October 1, 1896, to September 30, 1918, except that there are no records for 1901-2 and 1903-4.

GAGE.—Enameled vertical staff reading depth of water on crest of weir.

DISCHARGE MEASUREMENTS.—Made from plank across canal or by wading at various sections near gage.

CONTROL.—Rectangular weir with 6-foot crest length, 500 feet below intake. October 29, 1915, wooden weir board was replaced by concrete slab with steel plate for crest. Length of crest not changed. March, 1916, Mr. E. R. Bowen installed a weir at south portal of tunnel No. 2 and developed rating curves for the various crude weirs which had been used in previous years.

COOPERATION.—Daily-discharge record furnished by Escondido Mutual Water Co. Monthly discharge computed by United States Geological Survey.

The canal is 5.6 miles long; consists of flume, ditch, and tunnel sections constructed through a very rough, mountainous country. It discharges into a reservoir about 6 miles northeast of Escondido. The dam is 76 feet high and 380 feet long, is of the usual rock-fill type, and is faced with redwood planks. The reservoir (capacity 3,120 acre-feet) supplies water for irrigation and domestic uses at Escondido and vicinity.

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Daily discharge, in second-feet, of Escondido Mutual Water Co's canal near Nellie, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16.5	16.0	8.4	8.9	11.9	16.4	23	16.0	17.0	6.2	5.0	4.2
2	16.8	16.2	9.4	8.9	11.9	15.2	23	16.0	14.0	5.5	4.2	3.9
3	15.0	15.0	9.4	8.9	11.9	13.6	23	15.0	14.0	5.5	3.9	3.9
4	16.4	.0	9.9	10.4	10.9	13.6	23	16.0	13.0	5.5	3.9	3.9
5	17.1	16.1	9.4	9.9	10.9	14.1	23	16.0	12.5	5.5	4.2	3.9
6	16.5	15.1	9.4	9.4	11.9	14.1	23	16.0	12.0	5.0	3.9	3.5
7	16.5	14.9	8.9	8.9	13.0	23	22	16.0	12.0	5.0	3.9	3.1
8	2.6	15.0	8.4	8.9	13.0	25	23	19.0	11.0	5.0	4.2	3.1
9	14.8	16.1	8.4	10.4	10.9	28	23	20	11.0	6.2	3.9	.....
10	16.2	14.9	8.4	10.9	8.9	28	23	18.0	10.5	5.5	3.9	.....
11	16.4	.0	8.9	10.4	9.9	18.8	23	19.0	10.5	5.5	3.9	.....
12	16.8	16.4	8.9	10.4	10.4	.0	23	19.0	10.0	5.5	4.2	.....
13	16.0	16.6	9.9	14.4	10.9	.0	23	16.0	8.0	5.0	3.9	.....
14	16.7	16.0	9.9	17.6	10.9	.0	23	16.0	8.0	4.6	4.2	.....
15	16.7	16.6	9.4	14.4	10.9	.0	23	14.0	8.0	4.6	4.6	.....
16	16.2	16.5	9.4	14.4	9.9	.0	22	15.0	8.0	4.0	4.6	.....
17	16.0	16.1	8.9	13.0	9.9	12.0	21	15.0	12.5	4.0	4.6	.....
18	14.9	.0	8.4	11.9	15.2	12.0	20	15.0	9.0	4.0	4.2	.....
19	15.1	14.9	8.4	10.9	23	12.0	17.5	15.0	8.0	4.6	4.2	.....
20	16.5	16.1	8.9	10.4	28	12.0	16.0	14.0	20	4.0	3.9	.....
21	.0	16.0	9.4	9.9	23	12.0	.....	14.0	11.5	4.0	3.9	.....
22	15.0	16.3	9.4	10.9	15.2	12.0	.....	14.0	9.0	3.5	3.9	.....
23	15.1	16.2	9.9	9.9	.0	20	.....	13.5	8.0	3.5	3.9	.....
24	16.8	16.5	9.9	9.9	25	22	.....	13.5	8.0	3.6	3.9	.....
25	16.9	.0	9.9	11.9	23	22	.....	13.5	8.0	4.0	3.5	.....
26	18.4	16.1	9.9	17.6	25	22	.....	13.5	7.0	4.0	3.1	.....
27	16.2	14.9	9.4	20	20	23	19.0	13.5	6.2	4.8	3.1	.....
28	.0	16.2	9.4	20	15.2	23	19.0	20	6.2	4.5	3.9	.....
29	16.4	16.0	8.9	16.4	.....	23	19.0	20	6.2	4.0	3.5	.....
30	15.1	16.2	8.9	15.2	.....	23	19.0	20	6.2	3.6	3.1	.....
31	16.4	.....	8.9	13.0	.....	23	.....	18.0	.....	3.6	3.5	.....

NOTE.—No record Apr. 21-26. No flow Sept. 9-30.

Monthly discharge of Escondido Mutual Water Co.'s canal near Nellie, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	18.4	0.0	14.7	904
November	16.6	.0	13.8	821
December	9.9	8.4	9.19	565
January	20	8.9	12.2	750
February	28	.0	14.3	794
March	28	.0	15.6	959
April 1-20, 27-30	23	16.0	21.5	1,020
May	20	13.5	16.1	990
June	20	6.2	10.2	607
July	6.2	3.5	4.64	285
August	5.0	3.1	3.95	243
September	4.2	.0	.98	58.3
The year	.....	.....	.....	.....

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SANTA ANA RIVER BASIN.

SANTA ANA RIVER NEAR MENTONE, CALIF.

LOCATION.—In SW. ¼ sec. 4, T. 1 S., R. 2 W., near mouth of canyon, one-fourth mile above Southern California Edison Co.'s power plant, half a mile above mouth of Deep Creek, and 3½ miles northeast of Mentone, San Bernardino County.

DRAINAGE AREA.—189 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 1, 1896, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder installed September 7, 1917, on left bank at rock ledge one-fourth mile above power house, at same location and datum as vertical staff installed February 11, 1916. Previous staff, destroyed by the flood of January, 1916, was 10 feet upstream at an independent datum. Original gage was just above Warm Springs Canyon, 1½ miles upstream.

DISCHARGE MEASUREMENTS.—Made from cable just above gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; shifting during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 5.54 feet at 5 p. m. March 7 (discharge, from extension of rating curve, about 6,800 second-feet); minimum stage, 0.26 foot at 5 p. m. November 29 (discharge, 0.9 second-foot).

1896–1918: Gage washed out January 27, 1916, stage not known (discharge, computed from cross-section and slope, 29,100 second-feet); minimum stage, 2.3 feet during parts of every month from October, 1913, to January, 1914 (discharge, 0.6 second-foot).

DIVERSIONS.—The Southern California Edison Co.'s canal has its intake at power plant No. 2, 2½ miles above the gage. The Greenspot pipe line diverts water for irrigation from the forebay of this canal at the Mentone power house. From the tailrace the water is carried across Santa Ana River and used for irrigation.

REGULATION.—Water is stored on Bear Creek at Bear Valley reservoir. Southern California Edison Co.'s power plants Nos. 1 and 2 are 5¼ and 2¾ miles, respectively, above the Mentone plant, at the mouth of the canyon.

ACCURACY.—Stage-discharge relation not permanent during year. Rating curves fairly well defined. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except for March 7, 10–12, and September 10, when hourly discharge was averaged. Record good.

Discharge measurements of Santa Ana River near Mentone, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 25	F. C. Ebert	0.31	1.4	Apr. 19	F. C. Ebert	1.00	8.8
Jan. 6	do	.30	1.2	May 3	do	.86	4.5
Mar. 5	do	.34	1.4	June 5	C. W. Sopp	.78	2.6
17	do	2.16	118	July 25	F. C. Ebert	.74	2.6
21	do	2.03	85	Aug. 7	do	.76	2.0
22	do	2.00	78	Sept. 4	do	.87	3.0

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Daily discharge, in second-feet, of Santa Ana River near Mentone, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9.5	1.6	2.5	1.4	1.2	1.3	39	6.5	2.8	2.8	2.1	6.0
2	10	1.6	4.5	1.4	1.2	1.3	42	5.5	11	3.2	2.4	3.1
3	9	1.7	5.5	1.5	1.2	1.4	39	5.5	2.8	3.0	4.0	3.1
4	8.5	2.0	10	1.5	1.2	1.4	32	4.5	2.8	2.8	1.5	2.9
5	6.5	1.6	44	1.4	1.2	1.6	23	6	2.7	3.0	1.5	2.2
6	4.5	4.2	21	1.2	1.2	19	21	7.5	2.6	2.8	1.8	2.2
7	8	2.0	2.6	1.2	1.3	2,390	20	7.5	2.4	2.7	2.2	2.2
8	6	1.6	2.3	1.2	1.3	545	20	9.5	2.2	15	2.2	2.2
9	6	1.6	1.8	1.3	1.3	123	19	10	2.2	18	2.4	2.2
10	6.5	1.4	1.6	1.4	1.3	1,860	16	6	2.2	7	5.5	22
11	3.9	1.4	1.5	1.2	1.3	1,770	15	4.5	2.4	6	3.5	6
12	4.8	1.3	1.4	1.2	1.3	3,970	16	3.8	2.6	5	2.2	3.3
13	9.5	1.3	1.4	1.2	1.4	1,810	29	3.8	2.7	4.0	2.0	3.6
14	9.5	1.2	1.4	1.2	1.4	495	25	6.5	2.8	2.2	2.8	4.6
15	9.5	1.1	1.4	1.2	1.4	278	16	7	3.8	2.1	5.5	6.5
16	6	1.2	1.5	1.2	1.4	184	12	6	17	2.0	9	8
17	6	1.4	1.5	1.2	1.8	123	10	7	20	1.8	10	7.5
18	4.2	1.4	1.4	1.2	6	80	8.5	6.5	6.5	1.6	8	7
19	3.0	1.4	1.3	1.4	20	112	8.5	7	4.5	1.5	4.5	6
20	2.4	1.3	1.3	1.2	1.8	109	9	4.8	3.2	1.5	3.8	4.3
21	2.0	1.4	1.4	1.1	1.7	80	9	4.0	2.2	1.6	3.2	4.0
22	1.8	1.4	1.5	1.1	37	80	11	3.2	2.1	1.8	3.0	6.5
23	3.0	1.4	1.4	1.3	11	78	7.5	3.2	2.1	2.0	2.8	5.5
24	3.2	1.4	1.4	1.1	2.0	70	8.5	2.8	2.1	2.1	2.8	4.0
25	4.8	1.3	1.4	1.2	1.6	68	8.5	2.8	2.1	2.0	2.6	2.2
26	5	1.3	1.3	1.4	1.6	62	9	2.8	2.2	1.7	2.7	2.0
27	3.6	1.3	1.3	1.2	1.4	62	9	3.5	2.2	1.4	2.4	2.2
28	3.3	1.3	1.3	1.2	1.4	49	8.5	6.5	2.4	1.4	2.0	2.2
29	2.2	1.2	1.2	1.2	.....	39	8	6.5	2.4	1.4	1.8	2.0
30	1.8	1.2	1.3	1.2	.....	39	7.5	4.2	2.7	1.4	6	2.0
31	1.8	.....	1.4	1.2	.....	40	.....	3.0	.....	1.4	15	.....

NOTE.—No gage-height record July 10-12 and July 26; discharge estimated.

Monthly discharge of Santa Ana River near Mentone, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	10	1.8	5.22	321
November	4.2	1.1	1.52	90.4
December	44	1.2	4.03	248
January	1.5	1.1	1.25	76.9
February	37	1.2	3.85	214
March	3,970	1.3	460	28,300
April	42	7.5	16.9	101
May	10	2.8	5.42	333
June	20	2.1	4.06	242
July	18	1.4	3.43	211
August	15	1.5	3.91	240
September	22	2.0	4.58	273
The year	3,970	1.1	44.3	31,200

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Daily discharge, in second-feet, of Santa Ana River and canals near Mentone, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	104	81	70	60	51	51	126	88	76	84	88	92
2	104	90	70	65	51	49	130	84	84	89	88	89
3	103	90	74	66	51	51	126	84	76	87	90	87
4	102	90	33	70	51	49	120	100	77	87	88	89
5	100	85	44	69	56	49	108	92	81	89	86	88
6	98	83	21	69	61	104	110	96	81	89	86	86
7	96	90	51	60	65	2,480	110	94	80	89	86	86
8	94	85	66	60	61	545	112	96	80	101	86	86
9	94	70	66	60	61	184	106	96	80	104	86	86
10	94	69	66	51	57	1,930	104	92	80	93	92	103
11	92	69	60	65	57	1,770	102	88	83	87	88	87
12	93	74	60	65	65	3,970	106	85	87	89	86	87
13	98	74	60	69	65	1,810	120	80	89	88	86	88
14	98	69	60	65	69	570	112	90	89	88	89	91
15	94	60	65	65	74	358	104	91	90	86	92	92
16	94	60	60	60	74	264	100	90	106	83	95	94
17	94	69	60	60	74	210	98	91	109	86	96	94
18	92	69	60	60	70	168	96	90	96	83	94	93
19	91	65	60	60	20	200	96	91	94	86	90	92
20	90	65	60	60	59	196	94	89	92	82	88	90
21	90	69	65	60	65	166	94	88	86	86	87	90
22	90	80	60	60	125	168	96	84	83	88	84	96
23	91	74	69	60	99	166	92	84	80	86	84	92
24	91	80	60	60	71	160	98	84	80	88	87	88
25	93	80	55	69	62	156	94	81	75	86	87	86
26	93	80	51	60	59	150	93	84	72	83	87	83
27	92	80	55	55	57	126	93	88	83	79	86	83
28	91	74	60	55	51	126	92	90	83	85	83	86
29	90	74	60	55	.....	126	92	90	83	85	83	86
30	90	74	60	51	.....	126	88	88	84	87	92	86
31	85	.....	55	51	.....	128	.....	81	.....	85	104	.....

NOTE.—See page 40 for flow of Greenspot pipe line and page 39 for flow of Southern California Edison Co.'s canal.

Monthly discharge of Santa Ana River and canals near Mentone, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 189 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	104	85	94.2	0.498	0.57	5,790
November	90	60	75.7	.401	.45	4,500
December	74	21	58.6	.310	.36	3,600
January	70	51	61.1	.323	.37	3,760
February	125	20	63.6	.337	.35	3,530
March	3,970	49	536	2.84	3.27	33,000
April	130	88	104	.550	.61	6,190
May	100	81	88.7	.469	.54	5,450
June	109	72	84.6	.448	.50	5,030
July	104	79	87.4	.462	.53	5,370
August	104	83	88.5	.468	.54	5,440
September	103	83	89.2	.472	.53	5,310
The year	3,970	20	120	.635	8.62	87,000

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SOUTHERN CALIFORNIA EDISON CO.'S CANAL[1] AND GREENSPOT PIPE LINE NEAR MENTONE, CALIF.

LOCATION.—At Southern California Edison Co's. power plant at mouth of canyon, 2¾ miles below intake on Santa Ana River and 3 miles northeast of Mentone, San Bernardino County.

RECORD AVAILABLE.—1896 to September 30, 1918.

DISCHARGE.—Computed from records showing kilowatt output of power plant.

EXTREMES OF DISCHARGE.—1896–1918: Maximum mean daily discharge recorded, 97 second-feet March 16, 1905; no flow during short periods nearly every year.

DIVERSIONS.—Water diverted from the forebay by the Greenspot pipe line must be added to give total flow of canal. From 1903 to 1911 pipe line diverted from canal above forebay and no discharge was reported. The present pipe line was put in operation September 7, 1911.

ACCURACY.—The record for power canal is computed on the assumption that 1 second-foot develops 18.9 kilowatts.

The intake of this canal is at Southern California Edison Co.'s power plant No. 2, 2¾ miles above the Mentone plant at the mouth of the canyon. All the water, except that taken by the Greenspot line, is first used for development of power; after it leaves the Mentone power house, it is conducted across Santa Ana River in a flume and discharged into a lined canal from which it is distributed for irrigation. Before it enters the irrigation canal it passes through three power plants.

Daily discharge, in second-feet, of Southern California Edison Co's. canal near Mentone, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	85	70	59	50	45	45	85	72	64	72	77	77
2	85	79	59	55	45	43	85	69	64	77	77	77
3	85	79	59	55	45	45	85	69	64	75	77	75
4	85	79	20	59	45	43	85	86	65	75	77	77
5	85	74	0	59	50	43	83	77	69	77	75	77
6	85	70	0	59	55	85	85	80	69	77	75	75
7	79	79	42	50	59	85	85	77	69	77	75	75
8	79	74	55	50	55	0	85	77	69	77	75	75
9	79	59	55	50	55	61	80	77	69	77	75	75
10	79	59	55	41	50	69	80	77	69	77	77	72
11	79	59	50	55	50	0	80	75	72	72	75	72
12	79	64	50	55	55	0	83	72	75	75	75	75
13	79	64	50	59	55	0	83	67	77	75	75	75
14	79	59	50	55	59	75	80	75	77	77	77	77
15	79	50	55	55	64	77	80	75	75	75	77	77
16	79	50	50	50	64	77	80	75	80	72	77	77
17	79	59	50	50	64	85	80	75	80	75	77	77
18	79	59	50	50	56	85	80	75	80	72	77	77
19	79	55	50	50	0	85	80	75	80	75	77	77
20	79	55	50	50	53	85	77	75	80	72	75	77
21	79	59	55	50	59	83	77	75	75	75	75	77
22	79	70	50	50	83	85	77	72	72	77	72	80
23	79	64	59	50	83	85	77	72	69	75	72	77
24	79	70	50	50	64	88	80	72	69	77	75	75
25	79	70	45	59	56	85	77	69	64	75	75	75
26	79	70	41	50	53	85	75	72	61	72	75	72
27	79	70	45	45	51	72	75	75	72	69	75	72
28	79	64	50	45	45	75	75	75	72	75	72	75
29	79	64	50	45	.....	85	75	75	72	75	72	75
30	79	64	50	45	.....	85	72	75	72	77	77	75
31	74	.....	45	45	.....	85	.....	69	.....	75	80	.....

[1] Canal owned by Pacific Light & Power Corporation previous to 1917.

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Monthly discharge of Southern California Edison Co.'s canal near Bishop, Calif., for the year ending Sept. 30, 1912.

Month.	Discharge.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	[illegible]	[illegible]	[illegible]	[illegible]
November	[illegible]	[illegible]	[illegible]	[illegible]
December	[illegible]	[illegible]	[illegible]	[illegible]
January	[illegible]	[illegible]	[illegible]	[illegible]
February	[illegible]	[illegible]	[illegible]	[illegible]
March	[illegible]	[illegible]	[illegible]	[illegible]
April	[illegible]	[illegible]	[illegible]	[illegible]
May	[illegible]	[illegible]	[illegible]	[illegible]
June	[illegible]	[illegible]	[illegible]	[illegible]
July	[illegible]	[illegible]	[illegible]	[illegible]
August	[illegible]	[illegible]	[illegible]	[illegible]
September	[illegible]	[illegible]	[illegible]	[illegible]
The year	[illegible]		[illegible]	[illegible]

Daily discharge, in second-feet, of Owens River near Bishop, Calif., for the year ending Sept. 30, 1912.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6				[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7				[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8				[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9				[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10					[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11			[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12				[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13				[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14			[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15				[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16				[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17						[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18						[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19						[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25			[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
31					[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	

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Monthly discharge of Greenspot pipe line near Mentone, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9	9	9.0	553
November	9	9	9.0	536
December	9	.0	8.06	496
January	9	4.6	8.72	536
February	8.5	.0	5.48	304
March	4.6	.0	2.11	130
April	9	2.5	6.90	411
May	9	9	9.0	553
June	9	9	9.0	536
July	9	9	9.0	553
August	9	9	9.0	553
September	9	9	9.0	536
The year	9	.0	7.87	5,700

NOTE.—Computed by engineers of United States Geological Survey.

MILL CREEK AT FOREST HOME,[1] CALIF.

LOCATION.—In NW. ¼ NE. ¼ sec. 13, T. 1 S., R. 1 W., at Forest Home, San Bernardino County, 2½ miles below Falls Creek, 4 miles above Mountain Home Creek, and 14 miles east of Redlands.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 23, 1903, to September 30, 1918.

DISCHARGE.—Determined from flow in power canal plus flow over diverting dam. Current-meter measurements have been made on canal. Record of flow over diverting dam is roughly approximate.

EXTREMES OF DISCHARGE.—1903–1918: Maximum mean daily discharge, 2,200 second-feet March 7, 1918 (no record for flood of January, 1916); minimum mean daily discharge, 7.0 second-feet November 19 and 20, 1904.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Two sets of observations recorded each day at 6 a. m. and 6 p. m. Records for periods in which total flow of Mill Creek is diverted into power canal considered good; those for higher stages roughly approximate.

COOPERATION.—Daily-discharge record furnished by Southern California Edison Co., through H. W. Dennis, construction engineer.

[1] Akers Camp on map of San Gorgonio quadrangle, U. S. Geological Survey.

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Daily discharge, in second-feet, of Mill Creek at Forest Home, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12.7	11.8	11.3	10.0	9.4	10.5	37	39	35	26.5	21.2	17.0
2	12.6	11.8	11.2	10.0	9.4	10.5	37	39	38.5	25.8	21.2	15.7
3	12.8	11.6	11.0	10.0	9.3	10.7	37.5	[a]39	35	29.5	20.6	15.9
4	12.4	11.6	11.0	10.0	9.2	10.7	37.5	39	35	23.2	20.6	22.3
5	12.4	11.6	11.0	9.9	9.2	10.7	37.5	40	34.5	30.9	20.7	15.9
6	12.4	15.0	11.0	10.0	9.1	32.5	37	40	34	22.8	20.6	16.2
7	12.2	11.6	10.8	9.6	9.8	2,200	37	40	34	23.2	20.5	15.9
8	12.2	11.9	10.8	9.6	9.2	70	37	40	34	24.8	[a]21	16.0
9	12.2	12.2	10.8	9.6	9.0	13.3	37	40	34	29.5	21.6	16.1
10	12.2	12.1	10.8	7.5	9.1	755	37	40	34	30	21.8	15.8
11	12.2	11.9	10.8	9.3	9.1	320	37	39	34	27	20.5	15.8
12	12.2	11.9	10.8	9.6	9.1	1,750	37	38	32.5	27.5	20.4	16.1
13	12.3	11.8	10.8	9.8	9.1	120	39	38	[a]32	27.8	20.4	15.7
14	12.2	11.9	10.8	9.4	9.1	110	40	38	31.5	27.5	[a]20.3	15.7
15	12.2	11.8	10.8	9.4	9.1	75	40	38	[b]31.5	26.5	20.2	15.6
16	12.5	11.7	10.8	9.6	9.1	60	40	37.5	40	26.5	20.1	15.4
17	12.3	11.6	10.8	9.8	9.0	50	40	37.5	39	26.2	20.1	15.5
18	12.2	11.6	10.8	9.8	8.0	45	[a]40	37.5	39	26	19.8	15.5
19	12.3	11.6	10.8	9.8	8.4	48	40	37	38	25.5	19.4	15.2
20	12.1	11.5	10.6	10.0	9.7	47	40	37.7	37	24.5	18.9	14.2
21	12.1	11.5	10.4	9.1	10.7	48	40	37.5	35	24	18.3	15.5
22	12.2	11.6	10.4	11.3	27.0	46	40	37.2	35.5	24	18.1	15.9
23	11.9	11.5	10.3	9.1	12.8	45	40	36.5	35	24	18	15.2
24	11.9	11.9	10.4	9.1	11.1	41	40	36.5	33.8	24	17.6	15.6
25	11.9	11.6	10.3	10.5	10.7	41	40	36.5	33.8	24	17.9	15.6
26	11.8	11.6	10.4	10.2	10.4	42	40	36.5	32	22.6	18.2	15.2
27	11.8	11.5	10.3	9.2	10.3	42	40	36.5	30	23.1	18.6	15.6
28	11.8	11.6	10.2	9.6	10.2	40	40	36.5	29.5	22.2	18.5	15.4
29	11.8	11.3	10.2	9.6	.....	36	40	37	28.2	21.6	25.9	15.6
30	11.8	11.3	10.1	9.6	.....	37	40	36.5	27	21.5	22	15.2
31	11.8	.....	10.0	9.5	.....	37	.....	35	.....	21.2	17.8	.....

[a] Interpolated. [b] Estimated same as day before.

Monthly discharge of Mill Creek at Forest Home, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	12.8	11.8	12.2	750
November	15.0	11.3	11.8	702
December	11.3	10.0	10.7	658
January	11.3	7.5	9.66	594
February	27.0	8.0	10.2	566
March	2,200	10.5	200	12,300
April	40	37	38.8	2,310
May	40	35	37.9	2,330
June	40	27	34.1	2,030
July	30.9	21.2	25.3	1,560
August	25.9	17.6	20.0	1,230
September	22.3	14.2	15.9	946
The year	2,200	7.50	35.9	26,000

NOTE.—Computed by engineers of U. S. Geological Survey.

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LYTLE CREEK NEAR SAN BERNARDINO, CALIF.

LOCATION.—In NW. ¼ sec. 26, T. 2 N., R. 6 W., at Southern California Edison Co.'s diversion dam, below junction of North and Middle forks of Lytle Creek, in Angeles National Forest, 3 miles above mouth of canyon and 14 miles northwest of San Bernardino, San Bernardino County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 18, 1904, to September 30, 1918.

GAGE.—Watson water-stage recorder in pool above weir in power canal.

DISCHARGE.—Computed by combining determinations of flow in power canal with those of flow over diverting dam; discharge of power canal is measured near intake by an 8-foot steel plate rectangular weir; flow over diverting dam is estimated.

EXTREMES OF DISCHARGE.—1904–1918: Maximum mean daily discharge, 4,750 second-feet January 18, 1916; minimum mean daily discharge reported, 5.1 second-feet September 30 and October 3, 1904.

ACCURACY.—Daily discharge is mean of two observations recorded each day at 6 a. m. and 6 p. m. Record for periods in which total flow of Lytle Creek is diverted into power canal, good; for those in which discharge exceeds 23 second-feet (capacity of canal) they are roughly approximate.

COOPERATION.—Daily-discharge record furnished by Southern California Edison Co., through H. W. Dennis, construction engineer.

Daily discharge, in second-feet, of Lytle Creek near San Bernardino, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	22.1	22.2	22.6	23.2	22.0	32.6	60	34	34	29.8	28.6	28.6
2	22.2	22.2	22.6	21.9	22.0	33.8	60	34	34	29.8	28.6	28.6
3	22.2	22.2	22.4	23.4	22.0	30.8	60	34	34	29.8	28.6	28.6
4	22.2	22.2	22.5	22.2	21.7	28.8	60	34	34	29.8	28.6	28.6
5	22.2	22.2	22.2	22.2	21.6	29.6	55	34	34	29.8	28.6	28.6
6	22.2	22.2	22.2	22.2	21.8	46.5	50	34	34	29.8	28.6	28.6
7	22.2	22.4	22.6	22.1	15.7	62.0	50	34	33	29.8	28.6	28.6
8	22.2	22.2	22.1	22.0	22.2	346	50	34	32	29.8	28.6	28.6
9	22.2	22.2	23.9	22.1	22.5	147	50	34	32	29.8	28.6	28.6
10	22.2	23.5	22.2	21.8	22.4	300	67	34	32	29.4	28.6	28.6
11	22.2	23.7	22.2	22.2	22.1	650	62	34	32	29.0	28.6	28.6
12	22.2	24.1	22.2	22.2	21.8	550	62	34	32	29.0	28.6	28.6
13	22.2	23.4	22.2	19.9	18.6	321	62	34	32	29.0	28.6	28.6
14	22.2	23.4	22.2	22.3	16.3	222	62	34	32	28.8	28.6	28.8
15	22.2	22.8	22.2	22.1	16.2	153	62	34	32	28.6	28.6	28.8
16	22.2	22.8	22.2	22.0	20.0	122	62	34	32	28.6	28.6	29.1
17	22.2	22.2	22.2	22.0	20.0	112	62	34	32	28.6	28.6	28.9
18	22.2	22.4	22.1	22.0	19.5	80	62	34	32	28.6	28.6	28.6
19	22.2	23.0	22.2	21.4	20.3	80	62	34	32	28.6	28.6	28.6
20	22.2	22.8	22.2	20.7	19.3	80	62	34	32	28.6	28.6	28.6
21	22.2	22.8	22.2	21.2	22.6	102	62	34	32	28.6	28.6	28.6
22	22.2	22.6	21.1	21.4	22.2	87	62	34	32	28.6	28.6	28.6
23	22.2	22.6	18.6	21.4	29.7	82	62	34	32	28.6	28.6	28.6
24	22.2	22.8	[a] 18.9	20.8	22.6	60	62	34	32	28.6	28.6	28.6
25	22.2	22.7	19.1	21.0	22.8	60	62	34	30	28.6	28.6	28.6
26	22.2	22.8	18.8	19.6	21.8	60	62	34	30	28.6	28.6	28.6
27	22.2	22.6	17.2	21.8	43.4	60	62	34	29.7	28.6	28.6	28.6
28	22.2	22.9	18.8	21.4	39.4	60	62	34	29.7	28.6	28.6	28.6
29	22.2	23.0	22.1	21.4	.....	60	62	34	29.8	28.6	28.6	28.6
30	22.2	23.1	22.2	21.4	.....	60	62	34	29.8	28.6	28.6	28.6
31	22.2	.....	22.2	22.3	.....	60	.....	34	.....	28.6	28.6	.....

[a] Interpolated.

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Monthly discharge of Lytle Creek near San Bernardino, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	22.2	22.1	22.2	1,370
November	24.1	22.2	22.7	1,350
December	23.9	17.2	21.6	1,330
January	23.4	19.6	21.7	1,330
February	43.4	15.7	22.6	1,260
March	650	28.8	135	8,300
April	67	50	60.1	3,580
May	34	34	34.0	2,090
June	34	29.7	32.0	1,900
July	29.8	28.6	29.0	1,780
August	28.6	28.6	28.6	1,760
September	29.1	28.6	28.6	1,700
The year	650	15.7	38.3	27,800

NOTE.—Discharge computed by engineers of U. S. Geological Survey.

SAN JACINTO RIVER NEAR ELSINORE, CALIF.

LOCATION.—Near east line of sec. 9, T. 6 S., R. 4 W., 2¼ miles above junction with Elsinore Lake (low-water stage), one-fourth mile above highway crossing, and 2 miles southeast of Elsinore, Riverside County.

DRAINAGE AREA.—717 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1916, to September 30, 1918.

GAGE.—Vertical staff in two sections on right bank about one-fourth mile above highway crossing. Read by W. L. Wilhite.

DISCHARGE MEASUREMENTS.—Made from railway bridge three-fourths mile below gage or by wading below gage.

CHANNEL AND CONTROL.—Gravel and small boulders; practically permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.28 feet at 10 a. m. March 12 (discharge, 750 second-feet); stream dry for several months during year.

1916–1918: Maximum stage recorded, 19.0 feet at 11 a. m. January 28, 1916 (discharge, 14,000 second-feet); stream dry for several months each year.

DIVERSIONS.—The Temescal Water Co. diverts water for irrigation above the station. Water is also diverted above San Jacinto for irrigation.

REGULATION.—Water is stored for irrigation at Hemet reservoir on South Fork of San Jacinto River.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve fairly well defined below 500 second-feet; it is slight revision of curve for 1916–17. Gage read to hundredths about every other day. Daily discharge ascertained by applying gage height to rating table; interpolated for days on which gage was not read. Records good.

Discharge measurements of San Jacinto River near Elsinore, Calif., during the year ending Sept. 30, 1918.

[Made by F. C. Ebert.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 20	1.19	0.4	Mar. 17	1.98	50
Mar. 5	1.17	.6	22	2.00	51

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Daily discharge, in second-feet, of San Jacinto River near Elsinore, Calif., for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	0.3	1.2	1.6	1.2	0.5	0.2	0.2
2	.....	.4	1.2	1.6	1.2	.4	.2	.2
3	.....	.4	1.2	1.5	.8	.4	.2	.2
4	.....	.4	1.3	1.3	.4	.4	.2	.2
5	.....	.4	1.4	1.2	.4	.4	.2	.2
6	.....	.4	1.4	1.2	[a] 2.0	.4	.2	.2
7	.....	.4	1.4	1.6	[a] 4.0	.4	.2	.1
8	.....	.4	1.4	1.5	6.5	.4	.2	.1
9	.....	.4	1.4	1.4	[a] 20	.3	.2	.....
10	.....	.4	1.4	1.5	[a] 40	.2	.2	.....
11	.....	.5	1.6	1.6	61	.2	.2	.....
12	.....	.5	1.3	1.6	780	.2	.2	.....
13	0.2	.5	1.0	1.6	780	.2	.2	.....
14	.2	.5	.7	1.6	705	.2	.2	.....
15	.2	.5	.5	1.6	266	.2	.2	.....
16	.2	.6	.6	1.6	158	.2	.2	.....
17	.2	.7	.5	3.3	49	.4	.2	.....
18	.2	.7	.5	5.0	31	.6	.2	.....
19	.2	.7	.5	3.5	141	.4	.2	.....
20	.2	.7	.5	2.1	281	.3	.2	.....
21	.3	.7	.6	1.6	146	.3	.2	.....
22	.3	.7	.6	1.6	51	.2	.2	.....
23	.3	.7	.6	1.6	47	.2	.2	.....
24	.3	1.0	.6	1.6	46	.2	.2	.....
25	.3	1.2	.7	1.6	27	.2	.2	.....
26	.3	1.2	2.1	1.6	8.5	.2	.2	.....
27	.3	1.2	2.1	1.5	6.5	.2	.2	.....
28	.3	1.2	2.1	1.3	3.6	.2	.2	.....
29	.3	1.2	2.1	.....	.7	.2	.2	.....
30	.3	1.2	1.6	.....	.6	.2	.2	.....
31	.....	1.2	1.2	.....	.5	.....	.2	.....

[a] Estimated.

NOTE.—No flow Oct. 1 to Nov. 12 and June 9 to Sept. 30.

Monthly discharge of San Jacinto River near Elsinore, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November	0.3	0.0	0.15	8.9
December	1.2	.3	.69	42.4
January	2.1	.5	1.14	70.1
February	5	1.2	1.80	100
March	750	.4	115	7,070
April	.6	.2	.29	17.3
May	.2	.2	.20	12.3
June	.2	.0	.05	3.0
The year	750	.0	10.2	7,320

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ELSINORE LAKE AT ELSINORE, CALIF.

LOCATION.—A short distance southeast of outlet at Elsinore, Riverside County.

RECORDS AVAILABLE.—December 1, 1915, to September 30, 1918.

GAGE.—Vertical staff in several sections on northeast shore a short distance above outlet; read by W. L. Wilhite. Zero of gage at elevation 1,242.11 feet above mean sea level. Datum was raised 0.06 foot May 10, 1918.

Daily elevation, in feet, of Elsinore Lake at Elsinore, Calif., for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		57.1	57.0			58.2	57.8			
2									56.6	
3		57.1			58.5					
4			57.0			58.2	57.7	57.2		
5		57.1		57.2	58.6		57.7			56.0
6								57.2	56.5	
7			57.0				57.7	57.2		55.9
8		57.1			58.6	58.2				
9			57.0	57.4				57.2	56.5	
10					58.5	58.2	57.6	57.2		55.9
11		57.0	57.0	57.2						
12					58.5			57.0	56.4	
13				58.0		58.1				55.8
14			57.0		58.4					
15		57.1					57.6			
16			57.0	58.2				57.0	56.4	
17			57.0	58.4		58.0				55.8
18							57.5			
19		57.0			58.4	57.9		56.9	56.2	
20	57.2		57.0							
21		57.0					57.5	56.9		55.7
22				58.6					56.2	
23			57.1	58.6	58.3					
24										55.6
25			57.2	58.7		57.9	57.4	56.8		
26	57.2	57.1			58.3					55.5
27				58.7					56.1	
28		57.0	57.2			57.8				
29	57.1					57.8	57.3	56.7		
30	57.1	57.0		58.8					56.1	
31										

NOTE.—Add 1,200 feet to obtain mean sea level.

SAN ANTONIO CREEK NEAR CLAREMONT, CALIF.

LOCATION.—In NW. ¼ SE.¼ sec. 36, T. 2 N., R. 8 W., at highway bridge half a mile above Southern California Edison Co.'s power house (Sierra plant), 4 miles above mouth of canyon, and 8 miles northeast of Claremont, Los Angeles County.

DRAINAGE AREA.—16.9 square miles (measured on topographic map).

RECORDS AVAILABLE.—January 25, 1917, to September 30, 1918. (Discharge measurements only May 31 to Sept. 4, 1916.)

GAGE.—Gurley graph water-stage recorder on left bank at north end of highway bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading near gage.

CHANNEL AND CONTROL.—Coarse gravel and small boulders; subject to shift during high stages. One channel except at extreme floods when left bank is overflowed.

EXTREMES OF DISCHARGE.—1917–18: Maximum stage, from water-stage recorder, 4.00 feet at 3 p. m. March 7, 1918 (discharge, 362 second-feet); minimum stage, from water-stage recorder, 0.93 foot at 4 p. m. August 26, 1918 (discharge, 0.5 second-foot).

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Diversions.—The Southern California Edison Co. diverts water for power development above the station. (See p. 49.)

Regulation.—None except as indicated above.

Accuracy.—Stage-discharge relation not permanent during year. On account of slight change in the control three fairly well-defined rating curves were used during the year. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except for March 7 and 10 when hourly discharge was averaged. Records good.

Cooperation.—Southern California Edison Co. furnished attendant for water-stage recorder.

Discharge measurements of San Antonio Creek near Claremont, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 25	H. J. Tompkins	0.35	0.6	Apr. 18	C. W. Sopp	1.82	28
Dec. 15	do	.58	.7	May 8	H. J. Tompkins	1.73	19
Feb. 25	do	.72	2.7	14	do	1.60	15
Mar. 8	C. W. Sopp	2.47	68	23	C. W. Sopp	1.48	11
9	H. J. Tompkins	2.02	39	June 1	H. J. Tompkins	1.34	5.8
14	do	3.14	165	21	do	1.04	1.8
21	F. C. Ebert	2.39	68	July 19	C. W. Sopp	.98	.85
30	H. J. Tompkins	2.08	39	Aug. 28	H. J. Tompkins	.94	.7
Apr. 4	C. W. Sopp	2.06	41	Sept. 15	F. C. Ebert	.96	.6
11	H. J. Tompkins	1.90	35				

Daily discharge, in second-feet, of San Antonio Creek near Claremont, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.0	0.9	0.9	0.8	0.8	2.2	42	22	7	0.9	0.8	0.7
2	1.1	.9	.9	.8	.8	1.8	41	22	6.5	.9	.8	.7
3	1.1	.9	.9	.8	.8	1.8	41	22	6	.9	.8	.7
4	1.1	.9	.9	.8	.8	1.7	41	20	5.5	.9	.8	.7
5	1.1	1.0	.9	.8	.8	1.8	41	21	4.9	.9	.8	.7
6	1.2	1.2	.9	.8	.8	2.4	40	21	4.5	.9	.8	.7
7	1.2	1.1	.9	.7	.8	133	37	20	4.3	.9	.8	.7
8	1.1	1.1	.8	.7	.8	96	35	20	3.9	.9	.8	.7
9	1.1	1.0	.8	.8	.9	45	32	20	3.7	.9	.8	.7
10	1.0	.9	.8	.8	.9	94	31	20	3.5	.9	.8	.7
11	1.1	.9	.8	.8	.9	179	30	23	3.0	.9	.8	.7
12	1.1	.9	.7	.8	.9	184	30	18	2.5	.9	.8	.7
13	1.2	.9	.7	.8	.9	175	31	17	2.3	.9	.8	.8
14	1.2	.9	.8	.9	.9	165	30	15	2.1	.8	.8	.8
15	1.1	.9	.8	.9	.9	150	29	15	1.7	.8	.8	.8
16	1.1	.9	.8	.9	.9	130	27	14	2.0	.8	.8	.8
17	1.1	.9	.8	.9	1.1	110	26	14	1.7	.8	.8	.8
18	1.1	.9	.8	.9	1.1	96	25	13	1.7	.8	.8	.8
19	1.0	.9	.8	.9	1.1	89	26	12	1.7	.8	.8	.8
20	1.0	.9	.8	.9	1.1	88	25	11	1.7	.8	.8	.8
21	.9	.9	.8	.9	2.8	69	25	11	1.5	.8	.8	.8
22	.9	.9	.8	.8	10	65	24	11	1.4	.8	.8	.8
23	.8	.9	.8	.8	7	61	24	10	1.2	.8	.8	.8
24	.8	.9	.8	.8	3.6	57	24	10	1.2	.8	.8	.8
25	.7	.9	.8	1.1	3.4	53	24	10	1.1	.8	.7	.8
26	.8	.9	.8	1.0	3.8	50	24	9.5	1.1	.8	.6	.8
27	.8	.9	.8	1.0	3.4	49	24	9	1.0	.8	.6	.9
28	.8	.9	.8	.9	2.7	46	25	10	.9	.8	.6	.9
29	.9	.9	.8	.8	.....	45	24	9.5	.9	.8	.7	.9
30	.9	.9	.8	.8	.....	43	24	8.5	.9	.8	.7	.8
31	.8	.....	.8	.8	.....	43	.....	7.5	.....	.8	.7	.....

Note.—No gage-height record July 2–5; discharge interpolated.

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Monthly discharge of San Antonio Creek near Claremont, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1.2	0.8	1.00	61.5
November	1.2	.9	.92	55.3
December	.9	.7	.82	50.4
January	1.1	.7	.85	52.3
February	10	.8	1.65	108
March	104	1.7	75.1	4,620
April	42	24	30.1	1,790
May	23	7.5	15.0	922
June	7	.9	2.71	161
July	.9	.8	.84	51.6
August	.8	.6	.77	47.3
September	.9	.7	.77	45.8
The year	104	.6	11.0	7,970

Daily discharge, in second-feet, of San Antonio Creek and Southern California Edison Co.'s canal near Claremont, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	10	10	9	8	12	61	41	26	20	16	12
2	12	10	10	9	8.5	11	60	41	26	20	15	12
3	11	10	10	9	8.5	11	60	41	25	19	15	12
4	12	10	10	9	8.5	11	60	39	25	19	15	12
5	12	10	10	9	8.5	12	60	40	24	19	15	12
6	11	12	10	9	8.5	15	59	40	24	19	15	12
7	11	11	10	8.5	8.5	153	56	39	24	19	15	12
8	11	11	10	9	8.5	116	54	39	23	19	15	12
9	12	10	10	8.5	8.5	65	51	39	23	18	15	12
10	11	10	9.5	9	8.5	114	50	39	23	18	15	12
11	11	10	10	9	8.5	199	49	42	22	18	14	12
12	11	10	9.5	9	8.5	204	49	37	22	18	14	12
13	11	10	9.5	9	8.5	195	50	36	22	18	14	12
14	12	10	9.5	9	8.5	185	49	34	22	18	14	12
15	12	10	10	9	8.5	170	48	34	21	18	14	12
16	12	10	9.5	9	8.5	150	46	33	21	17	14	12
17	11	10	9.5	8.5	8.5	120	45	33	21	17	14	12
18	11	10	9.5	9	9	116	44	32	21	17	14	12
19	11	10	9.5	9	8.5	109	45	31	21	17	14	11
20	11	10	9.5	9	9	108	44	30	21	17	14	11
21	11	10	9.5	8.5	12	89	44	30	21	16	13	11
22	10	10	9	8.5	26	85	43	30	21	16	14	11
23	10	10	9.5	9	18	81	43	29	20	17	14	11
24	10	10	9	8.5	14	77	43	29	20	16	13	11
25	11	10	9	9.5	14	73	43	29	20	16	13	11
26	11	10	9	9	14	70	43	29	20	16	13	11
27	11	10	9	9	14	69	43	28	20	16	13	12
28	10	10	9	9	12	66	44	29	20	16	13	12
29	10	10	9	8.5	.....	65	43	29	20	16	13	11
30	10	10	9	8.5	.....	63	43	28	20	15	12	11
31	10	.....	9	8.5	.....	63	.....	27	.....	15	13	.....

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Monthly discharge of San Antonio Creek and Southern California Edison Co.'s canal near Claremont, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 16.9 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	12	10	11.0	0.651	0.75	676
November	12	10	10.1	.598	.67	601
December	10	9	9.53	.564	.65	586
January	9	8.5	8.87	.525	.61	545
February	26	8	10.6	.627	.65	589
March	204	11	93.1	5.51	6.35	5,720
April	61	43	49.1	2.91	3.25	2,920
May	42	27	34.1	2.02	2.33	2,100
June	26	20	22.0	1.30	1.45	1,310
July	20	15	17.4	1.03	1.19	1,070
August	16	12	14.0	.828	.95	861
September	12	11	11.7	.692	.77	696
The year	204	8	24.4	1.44	19.62	17,700

SOUTHERN CALIFORNIA EDISON CO.'S CANAL[1] NEAR CLAREMONT, CALIF.

LOCATION.—In NW. ¼ sec. 1, T. 1 N., R. 8 W., at weir in tailrace of Sierra power house, on San Antonio Creek, 1½ miles below intake and about 8 miles northeast of Claremont, Los Angeles County.

RECORDS AVAILABLE.—January 1, 1917, to September 30, 1918.

GAGE.—Hook gage, which indicates head on weir; read by B. F. Campbell, operator at power house.

DISCHARGE.—Computed from head on 10-foot rectangular weir.

ACCURACY.—Gage is read at 8 a. m. and 4 p. m. Discharge computed from weir table by observer. Records good.

COOPERATION.—Discharge record furnished by Southern California Edison Co.

This canal diverts water from San Antonio Creek in SE. ¼ sec. 25, T. 2 N., R. 8 W., 1 mile above gaging station on San Antonio Creek near Claremont. The water is used for power development at Sierra power house, in NW. ¼ sec. 1, T. 1 N., R. 8 W., and then returned directly to creek.

[1] Canal owned by Pacific Light & Power Corporation previous to 1917.

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Daily discharge, in second-feet, of Southern California Edison Co.'s canal near Claremon Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept
1	11.2	9.5	8.9	8.2	7.4	9.5	19.4	19.4	19.4	18.6	15.1	11.
2	11.2	9.4	9.1	8.2	7.8	9.4	19.4	19.4	19.4	18.7	14.6	11.
3	10.2	9.4	9.1	8.2	7.8	9.4	19.4	19.4	19.4	18.5	14.2	11.
4	10.7	9.5	9.0	8.1	7.7	9.5	19.4	19.4	19.4	18.3	14.1	11.
5	10.4	9.5	9.1	8.2	7.8	10.0	19.4	19.4	19.4	18.3	14.3	11.
6	10.1	10.5	9.0	8.1	7.6	12.2	19.4	19.4	19.4	18.1	13.8	11.
7	10.1	10.0	9.0	8.0	7.8	19.6	19.4	19.4	19.4	17.8	14.1	11.
8	10.1	9.6	9.0	8.1	7.6	19.7	19.4	19.4	19.4	17.8	14.0	11.
9	10.5	9.5	9.0	7.9	7.6	20.3	19.4	19.4	19.4	17.6	14.0	11.
10	10.1	9.5	8.9	8.0	7.6	20.4	19.4	19.4	19.4	17.4	13.8	11.
11	10.1	9.6	9.0	8.1	7.6	20.3	19.4	19.4	19.4	17.4	13.4	11.
12	10.3	9.5	9.0	8.0	7.6	20.2	19.4	19.4	19.4	17.3	13.5	11.
13	10.2	9.5	8.9	8.1	7.6	20.2	19.4	19.4	19.4	17.1	13.4	11.
14	10.4	9.3	8.8	8.0	7.6	20.3	19.4	19.4	19.4	17.4	13.4	10.
15	10.4	9.5	9.0	8.1	7.6	20.1	19.4	19.4	19.4	17.0	13.6	11.
16	10.4	9.5	8.8	8.1	7.5	19.6	19.4	19.4	19.4	16.5	13.5	11.
17	10.2	9.4	8.6	7.8	7.6	19.5	19.4	19.4	19.4	16.5	13.3	10.
18	10.2	9.2	8.5	7.9	7.8	19.6	19.4	19.4	19.4	16.0	13.2	10.
19	10.2	9.0	8.5	7.9	7.6	19.6	19.4	19.4	19.4	15.9	13.1	10.
20	10.0	9.0	8.7	7.9	7.9	19.6	19.4	19.4	19.4	16.0	13.0	10.
21	9.8	9.1	8.5	7.8	10.3	19.6	19.4	19.4	19.4	15.6	12.6	10.
22	9.4	8.9	8.4	7.9	16.1	19.6	19.4	19.4	19.3	15.4	12.8	10.
23	9.7	9.2	8.6	8.0	11.0	19.6	19.4	19.4	18.9	15.9	12.7	10.
24	9.7	9.2	8.4	7.8	10.6	19.6	19.4	19.4	19.1	15.3	12.5	10.
25	9.9	9.1	8.4	8.5	10.1	19.6	19.4	19.4	18.9	15.2	12.3	10.
26	9.9	9.0	8.2	8.2	10.6	19.6	19.4	19.4	19.2	15.1	12.4	10.
27	9.9	9.1	8.4	8.0	10.1	19.6	19.4	19.4	19.4	15.0	12.0	11.
28	9.5	9.1	8.3	7.9	9.6	19.6	19.4	19.4	19.0	15.0	12.3	10.
29	9.4	9.0	8.3	7.8	.....	19.6	19.4	19.4	18.8	14.9	12.3	10.
30	9.5	8.9	8.2	7.8	.....	19.6	19.4	19.4	18.6	14.5	11.8	10.
31	9.7	.....	8.1	7.8	.....	19.6	.....	19.4	.....	14.5	11.9	.....

Monthly discharge of Southern California Edison Co.'s canal near Claremont, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	11.2	9.4	10.1	621
November	10.5	8.9	9.35	556
December	9.1	8.1	8.70	535
January	8.5	7.8	8.01	493
February	16.1	7.4	8.62	479
March	20.4	9.4	17.9	1,100
April	19.4	19.4	19.4	1,150
May	19.4	19.4	19.4	1,190
June	19.4	18.6	19.3	1,150
July	18.7	14.5	16.6	1,020
August	15.1	11.8	13.3	818
September	11.7	10.2	10.9	649
The year	20.4	7.4	13.5	9,760

SAN GABRIEL RIVER BASIN.

SAN GABRIEL RIVER NEAR AZUSA, CALIF.

LOCATION.—In NW. ¼ sec. 23, T. 1 N., R. 10 W., near road crossing at mouth of canyon, half a mile above Southern California Edison Co.'s power house and 2 miles north of Azusa, Los Angeles County.

DRAINAGE AREA.—222 square miles.

RECORDS AVAILABLE.—1894 to September 30, 1918.

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GAGE.—Gurley graph water-stage recorder on left bank at rock point above ford. Original location of gage was just above ford at mouth of canyon. On account of frequent changes in channel it has been necessary to install numerous gages at points from 1,000 feet above ford to 600 feet below. Most of the various gages used from time to time have been installed at independent datums.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above ford or by wading near gage.

CHANNEL AND CONTROL.—Gravel and boulders; shift during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 9.45 feet at 1.30 p. m. March 7 (discharge, 8,680 second-feet); stream dry at gage October 1 to February 20 and June 12 to September 30.

1894–1918: Maximum stage recorded, 12.0 feet January 18, 1916 (discharge, 40,000 second-feet); stream dry for several months each year.

DIVERSIONS.—The power canal of the Southern California Edison Co. heads about 5 miles above the station. Water was diverted through the tunnel about 500 feet above ford April 3 to June 22. (For daily discharge of these canals see pp. ——.)

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent throughout year. Rating curves fairly well defined. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except February 22 and March 7 and 10 when discharge for two-hour intervals was averaged, and March 12–22 when shifting-control method was used. Records fair.

Discharge measurements of San Gabriel River near Azusa, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 22	F. C. Ebert	6.82	2730	Mar. 30	F. C. Ebert	5.38	356
23	do	5.10	487	Apr. 7	do	5.24	317
25	do	4.68	234	13	H. J. Tompkins	5.10	259
26	do	4.86	322	19	do	4.57	118
Mar. 4	do	4.11	50	26	do	4.48	119
7	C. W. Sopp	8.20	5,650	May 1	F. C. Ebert	4.20	77
8	do	6.52	1,930	7	C. W. Sopp	4.08	72
11	do	7.60	4,280	10	F. C. Ebert	3.86	53
15	H. J. Tompkins	6.90	1,180	17	C. W. Sopp	3.64	42
18	do	6.20	680	18	do	3.29	20
21	F. C. Ebert	5.89	626	24	do	2.73	3.0
23	do	5.75	542	June 5	F. C. Ebert	2.52	0.3

Daily discharge, in second-feet, of San Gabriel River near Azusa, Calif., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May	June.	Day.	Feb.	Mar.	Apr.	May.	June.
1	.....	100	410	76	0.7	16	.....	1,050	164	42	.....
2	.....	64	388	72	.7	17	.....	850	142	36	.....
3	.....	52	367	70	.6	18	.....	720	132	20	.....
4	.....	44	348	69	.4	19	.....	790	124	18	.....
5	.....	42	328	75	.2	20	.....	690	124	15	.....
6	.....	184	310	75	1.1	21	200	630	115	13	.....
7	.....	4,120	310	66	1.4	22	1,580	500	115	11	.....
8	.....	2,030	292	58	1.1	23	400	530	115	4.2	.....
9	.....	870	292	55	1.1	24	184	505	114	2.4	.....
10	.....	1,810	292	53	.9	25	241	480	112	2.4	.....
11	.....	4,940	276	51	.4	26	292	455	112	2.1	.....
12	.....	4,100	259	49	.....	27	207	432	103	1.6	.....
13	.....	3,520	259	47	.....	28	148	410	99	2.8	.....
14	.....	1,950	229	44	.....	29	.....	388	89	4.9	.....
15	.....	1,250	175	43	.....	30	.....	348	78	3.7	.....
						31	.....	348	.....	1.0	.....

NOTE.—No flow Oct. 1 to Feb. 20 and June 12 to Sept. 30.

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Monthly discharge of San Gabriel River near Azusa, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February	1,580	.0	116	6,440
March	4,940	42	1,100	67,600
April	410	78	209	12,400
May	76	1.0	34.9	2,150
June	1.4	.0	.29	17.2
The year	4,940	.0	123	88,600

NOTE.—See page 53 for Southern California Edison Co.'s canal near Azusa and page 54 for tunnel diversion near Azusa.

Daily discharge, in second-feet, of San Gabriel River and canals near Azusa, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	24	32	32	35	190	410	203	129	83	52	42
2	24	24	32	32	34	154	388	197	128	81	52	41
3	23	24	32	32	34	142	382	195	126	76	49	39
4	23	24	34	32	33	134	368	194	122	78	46	40
5	22	26	34	32	32	132	348	177	119	74	48	39
6	22	37	33	31	32	274	330	194	117	73	48	35
7	22	40	33	31	34	4,210	332	185	111	72	50	37
8	22	36	32	31	33	2,120	317	177	107	71	49	36
9	22	34	32	32	32	960	317	174	107	70	47	36
10	22	33	32	31	32	1,900	332	175	105	69	48	35
11	22	32	32	30	32	5,030	321	173	104	70	47	34
12	24	32	32	31	31	4,190	319	171	102	69	47	34
13	27	32	33	33	31	3,610	299	175	102	68	46	34
14	28	32	33	33	32	2,040	311	172	98	68	48	38
15	29	32	33	33	32	1,340	275	175	98	65	50	39
16	31	32	32	33	32	1,140	261	174	98	65	53	41
17	32	32	32	33	32	940	239	175	97	62	51	40
18	31	32	32	33	61	810	257	159	96	61	49	37
19	27	29	32	32	46	880	249	140	95	60	47	37
20	28	29	32	32	64	780	256	140	94	58	47	38
21	27	29	32	32	290	720	228	138	93	57	46	35
22	26	30	32	32	1,670	590	234	139	92	57	44	38
23	25	31	32	32	490	620	234	136	88	57	42	38
24	24	32	33	32	274	595	233	138	89	57	42	38
25	24	32	33	38	331	570	231	140	88	58	40	37
26	23	32	33	38	382	545	231	141	87	58	39	36
27	24	32	33	36	297	522	222	141	84	55	41	56
28	26	32	33	35	238	500	226	139	82	53	40	55
29	27	32	32	35	.....	478	214	141	83	52	43	48
30	27	32	32	35	.....	438	203	137	81	51	41	43
31	26	.....	32	35	.....	438	.....	129	.....	50	41	.....

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Monthly discharge of San Gabriel River and canals near Azusa, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 222 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	32	22	25.3	0.114	0.13	1,560
November	40	24	31.0	.140	.16	1,840
December	34	32	32.5	.146	.17	2,000
January	38	30	32.9	.148	.17	2,020
February	1,670	31	168	.757	.79	9,330
March	5,030	132	1,190	5.36	6.18	73,200
April	410	208	286	1.29	1.44	17,000
May	203	129	163	.734	.85	10,000
June	129	81	101	.455	.51	6,010
July	83	50	64.5	.291	.34	3,970
August	53	39	46.2	.208	.24	2,840
September	56	34	39.2	.177	.20	2,330
The year	5,030	22	183	.824	11.18	132,000

SOUTHERN CALIFORNIA EDISON CO.'S[1] CANAL NEAR AZUSA, CALIF.

LOCATION.—At Southern California Edison Co.'s power house, 5 miles southwest of intake on San Gabriel River and 1½ miles north of Azusa, Los Angeles County.

RECORDS AVAILABLE.—1896 to September 30, 1918.

DISCHARGE.—Computed from record showing kilowatt output of power plant on the assumption that 1 second-foot develops 25 kilowatts.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year 90 second-feet during February, March, April, May, and June. Canal dry April 1–13.

1896–1918: Maximum mean daily discharge recorded, 97 second-feet; November 27, 1906; canal usually dry for a few days each year.

ACCURACY.—Records good.

Diversion dam for canal is on San Gabriel River in SE. ¼ SE. ¼ sec. 31, T. 2 N., R. 9 W., 5 miles above gaging station on San Gabriel River at the mouth of the canyon near Azusa. The water is used for power development at a point about 1½ miles north of Azusa, and after leaving the power plant is divided and used for irrigation—part is discharged into Azusa-Covina canal and the remainder into Duarte canal. During the rainy season part of the water from the power plant is wasted back into San Gabriel River below the gaging station.

[1] Canal owned by Pacific Light & Power Corporation until 1917.

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Daily discharge, in second feet, of Southern California Edison Co.'s canal near Azusa, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	24	32	32	35	90	.....	90	90	83	52	42
2	24	24	32	32	34	90	.....	90	90	81	52	41
3	23	24	32	32	34	90	.....	90	90	76	49	39
4	23	24	34	32	33	90	.....	90	90	78	46	40
5	22	26	34	32	32	90	.....	90	90	74	48	39
6	22	37	33	31	32	90	.....	90	90	73	48	35
7	22	40	33	31	34	90	.....	90	90	72	50	37
8	22	36	32	31	33	90	.....	90	90	71	49	36
9	22	34	32	32	32	90	.....	90	90	70	47	36
10	22	33	32	31	32	90	.....	90	90	69	48	35
11	22	32	32	30	32	90	.....	90	90	70	47	34
12	24	32	32	31	31	90	.....	90	90	69	47	34
13	27	32	33	33	31	90	.....	90	90	68	46	34
14	28	32	33	33	32	90	52	90	90	68	48	38
15	29	32	33	33	32	90	90	90	90	65	50	39
16	31	32	32	33	32	90	90	90	90	65	53	41
17	32	32	32	33	32	90	90	90	90	62	51	40
18	31	32	32	33	61	90	90	90	90	61	49	37
19	27	29	32	32	46	90	90	90	90	60	47	37
20	28	29	32	32	64	90	90	90	90	58	47	38
21	27	29	32	32	90	90	90	90	90	57	46	35
22	26	30	32	32	90	90	90	90	90	57	44	38
23	25	31	32	32	90	90	90	90	88	57	42	38
24	24	32	33	32	90	90	90	90	89	57	42	38
25	24	32	33	38	90	90	90	90	88	58	40	37
26	23	32	33	38	90	90	90	90	87	58	39	36
27	24	32	33	36	90	90	90	90	84	55	41	56
28	26	32	33	35	90	90	90	90	82	53	40	55
29	27	32	32	35	.....	90	90	90	83	52	43	48
30	27	32	32	35	.....	90	90	90	81	51	41	43
31	26	.....	32	35	.....	90	.....	90	.....	50	41	.....

NOTE.—No flow Apr. 1-13.

Monthly discharge of Southern California Edison Co.'s canal near Azusa, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	32	22	25.3	1,560
November	40	24	31.0	1,840
December	34	32	32.5	2,000
January	38	30	32.9	2,020
February	90	31	51.6	2,870
March	90	90	90.0	5,530
April	90	0	49.7	2,960
May	90	90	90.0	5,530
June	90	81	88.7	5,280
July	83	50	64.5	3,970
August	53	39	46.2	2,840
September	56	34	39.2	2,330
The year	90	0	53.5	38,700

TUNNEL DIVERSION NEAR AZUSA, CALIF.

LOCATION.—About on line between secs. 22 and 23, T. 1 N., R. 10 W., at weir box where water is divided between Azusa and Duarte canals, 1,000 feet northeast of Southern California Edison Co.'s power plant, and 1½ miles north of Azusa, Los Angeles County.

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

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GAGE.—Gage heights are determined by measuring distance to water surface from reference point on north wall of weir box. Gage read by B. Bunje.

DISCHARGE MEASUREMENTS.—Made by wading near reference point.

CHANNEL AND CONTROL.—Concrete weir box.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to half-tenths daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

The intake of this canal is on San Gabriel River about 600 feet above United States Geological Survey gaging station on San Gabriel River near Azusa. Water is used to augment the irrigation supply obtained from the tailrace of the Southern California Edison Co.'s power plant and to provide a supply when the water is shut out of power canal.

Discharge measurements of tunnel diversion near Azusa, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 7	F. C. Ebert	1.36	22	May 18	Sopp and Tompkins	.98	48
13	H. J. Tompkins	.....	40	24	C. W. Sopp	.95	49
19	Sopp and Tompkins	1.29	25	June 5	Ebert and Sopp	1.28	28
May 1	F. C. Ebert	1.24	28	6	F. C. Ebert	1.37	22
10	do	1.15	34	15	do	1.69	8.6
17	C. W. Sopp	1.24	30	21	H. J. Tompkins	.....	4.8

Daily discharge, in second-feet, of tunnel diversion near Azusa, Calif., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	Day.	Apr.	May.	June.	Day.	Apr.	May.	June.
1	.....	37	38	11	45	32	14	21	23	35	3
2	.....	35	37	12	60	32	12	22	29	38	2
3	15	35	35	13	40	38	12	23	29	42	.....
4	20	35	32	14	29	38	8.5	24	29	46	.....
5	20	12	29	15	10	42	8.5	25	29	48	.....
6	20	29	26	16	7	42	8.5	26	29	49	.....
7	22	29	20	17	7	49	7	27	29	49	.....
8	25	29	16	18	35	49	6	28	37	46	.....
9	25	29	16	19	35	32	5	29	35	46	.....
10	40	32	14	20	42	35	4	30	35	43	.....
								31	.....	38	.....

NOTE.—No flow Oct. 1 to Apr. 2 and June 23 to Sept. 30. Discharge for Apr. 3–6 and 8–12 estimated by observer; June 17–22 interpolated.

Monthly discharge of tunnel diversion near Azusa, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April	60	0	26.7	1,590
May	49	12	37.8	2,320
June	38	0	11.8	702
The year	60	0	6.37	4,610

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ROGERS CREEK NEAR AZUSA, CALIF.

LOCATION.—In the southwest corner of sec. 14, T. 1 N., R. 10 W., half a mile above mouth of creek and 2¼ miles north of Azusa, Los Angeles County.

DRAINAGE AREA.—6.4 square miles (measured on topographic map).

RECORD AVAILABLE.—October 1, 1917, to September 30, 1918. (Discharge measurements only May 8, 1916, to June 11, 1917.)

GAGE.—Stevens water-stage recorder on left bank at mouth of canyon, one-half mile above junction with San Gabriel River.

DISCHARGE MEASUREMENTS.—Made by wading or from cable about 150 feet below gage.

CHANNEL AND CONTROL.—Boulders, gravel, and solid rock; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 5.25 feet at 11.30 p. m. March 10 (discharge, 332 second-feet); stream dry October 1 to November 10 and July 20 to September 30.

DIVERSIONS.—None above.

REGULATION.—None.

ACCURACY.—Stage discharge relation not permanent throughout year. Rating curves well defined below 150 second-feet. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except March 7, 10, and 11, when hourly discharge was averaged. Records good.

Discharge measurements of Rogers Creek near Azusa, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 27	E. Tompkins	0.72	0.09	Mar. 23	F. C. Ebert	1.80	12
Feb. 19	H. J. Tompkins	.88	.39	30	do	1.60	7.9
22	F. C. Ebert	2.63	43	Apr. 8	H. J. Tompkins	1.46	5.1
23	do	1.66	7.5	13	do	1.50	6.1
25	C. W. Sopp	1.71	8.4	19	C. W. Sopp	1.29	3.6
26	F. C. Ebert	1.70	7.9	26	H. J. Tompkins	1.28	3.2
Mar. 2	H. J. Tompkins	1.18	1.6	May 7	C. W. Sopp	1.18	2.5
4	F. C. Ebert	1.11	1.4	21	H. J. Tompkins	1.11	2.0
8	C. W. Sopp	2.37	27	June 6	do	1.00	.9
11	do	3.55	103	21	do	.82	.33
15	do	2.32	27	July 13	do	.72	.13
21	F. C. Ebert	1.90	15				

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Daily discharge, in second-feet, of Rogers Creek near Azusa, Calif., for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	.....	0.2	0.1	0.1	2.4	7.5	2.3	1.6	0.6
2	.....	.2	.1	.1	1.8	7.5	2.2	1.4	.4
3	.....	.1	.1	.1	1.6	7	2.1	1.2	.3
4	.....	.1	.1	.1	1.3	6.5	2.2	1.2	.3
5	.....	.1	.1	.1	1.5	6	2.3	1.2	.2
6	.....	.1	.05	.1	5	5.5	2.4	1.0	.2
7	.....	.1	.05	.2	96	5.5	2.3	1 0	.2
8	.....	.1	.1	.2	32	5	2.3	.9	.2
9	.....	.05	.1	.2	16	4.8	2.3	.8	.1
10	.....	.05	.1	.1	45	4.8	2.3	.8	.1
11	0.05	.05	.1	.1	144	4.6	2.1	.8	.1
12	.1	.05	.1	.1	89	4.6	2.0	.8	.1
13	.3	.05	.1	.1	65	5.5	1.8	.7	.1
14	.3	.05	.2	.1	41	4.8	1.7	.7	.2
15	.3	.05	.2	.1	28	4.3	1.8	.6	.2
16	.3	.05	.1	.1	22	4.1	1.8	.6	.2
17	.3	.05	.1	.2	19	3.8	1.9	.6	.1
18	.2	.05	.1	1.2	16	3.3	1.9	.5	.04
19	.2	.05	.1	.4	19	3.0	1.8	.6	.02
20	.2	.05	.1	.8	17	3.0	1.8	.6	.....
21	.1	.05	.1	6.4	15	3.0	1.8	.5	.....
22	.2	.05	.1	28	13	3.0	1.7	.4	.....
23	.2	.05	.1	8	12	3.0	1.6	.5	.....
24	.2	.1	.1	3.2	12	3.0	1.7	.6	.....
25	.2	.1	.2	9	11	3.1	1.7	.5	.....
26	.2	.1	.2	7.5	10	3.1	1.7	.5	.....
27	.2	.1	.1	5.5	10	3.0	1.7	.4	.....
28	.2	.1	.1	3.2	9	2.8	1.8	.4	.....
29	.2	.1	.1	.....	8.5	2.8	1.8	.4	.....
30	.2	.1	.1	.....	8	2.6	1.7	.5	.....
31	.....	.1	.1	.....	7.5	.....	1.6	.....	.....

NOTE.—No flow Oct. 1 to Nov. 10 and Aug. 20 to Sept. 30. No gage-height record Jan. 9-12, discharge interpolated.

Monthly discharge of Rogers Creek near Azusa, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 6.4 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
November	.3	.0	.138	0.022	0.02	8.21
December	.2	.05	.062	.013	.01	5.04
January	.2	.05	.110	.017	.02	6.76
February	28	.1	2.69	.420	.44	149
March	144	1.3	25.1	3.92	4.52	1,540
April	7.5	2.6	4.35	.680	.76	259
May	2.4	1.6	1.94	.303	.35	119
June	1.6	.4	.743	.116	.13	44.2
July	.6	.00	.118	.018	.02	7.26
The year	144	.00	2.96	.462	6.27	2,140

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FISH CREEK NEAR DUARTE, CALIF.

LOCATION.—In SW. ¼ SW. ¼ sec. 15, T. 1 N., R. 10 W., three-fourths of a mile above mouth of canyon and 4 miles northeast of Duarte, Los Angeles County.

DRAINAGE AREA.—6.5 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 23 to September 30, 1916; July 28, 1917, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder installed July 28, 1917, at same location and datum as vertical staff.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Gravel and boulders; appears permanent. Banks are high and not subject to overflow. A concrete control has been built at an outcrop of bedrock a short distance below gage.

EXTREMES OF DISCHARGE.—Maximum discharge during year, from water-stage recorder, 4.50 feet at 4 p. m. March 10 (discharge, 330 second-feet): minimum stage, 1.59 feet September 12 and 13 (discharge, 0.1 second-foot).

DIVERSIONS.—None above.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent throughout year on account of repairs to control. Rating curves fairly well defined. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except that for March 7 and 10, for which it was determined by averaging the results obtained by applying to rating table gage height for two-hour intervals. Records good.

Discharge measurements of Fish Creek near Duarte, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	Ernest Tompkins	1.74	0.35	Mar. 21	C. W. Sopp	2.48	15
Nov. 8	H. J. Tompkins	1.82	.65	29	F. C. Ebert	2.26	7.2
Dec. 19	Ernest Tompkins	1.78	.50	30	H. J. Tompkins	2.22	7.0
Jan. 18	Ebert and Sopp	1.82	.65	Apr. 4	C. W. Sopp	2.22	5.3
Feb. 7	H. J. Tompkins	1.86	.75	18	do	2.11	4.0
21	F. C. Ebert	2.71	21	May 3	do	2.03	2.3
23	do	2.37	8.4	21	do	2.00	1.9
25	H. J. Tompkins	2.48	14	June 7	do	1.92	1.4
Mar. 6	C. W. Sopp	2.28	6.9	21	H. J. Tompkins	1.82	.42
7	do	4.00	231	July 13	do	1.72	.16
20	F. C. Ebert	2.52	18	27	do	1.70	.15

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Daily discharge, in second-feet, of Fish Creek near Duarte, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.2	0.2	0.6	0.4	0.6	4.1	6.5	2.4	1.7	0.6	0.1	0.1
2	.2	.1	.6	.4	.6	3.2	6.5	2.0	1.6	.6	.1	.1
3	.2	.1	.7	.4	.6	3.0	6.5	2.0	1.4	.3	.1	.1
4	.2	.1	.7	.4	.6	2.6	6.5	1.9	1.5	.3	.1	.1
5	.2	.2	.7	.4	.6	3.1	6	2.2	1.4	.2	.1	.1
6	.2	1.3	.6	.5	.6	7.5	6	2.4	1.3	.2	.1	.1
7	.2	.8	.6	.5	1.0	151	5.5	2.2	1.1	.2	.1	.1
8	.2	.6	.6	.5	.9	43	5.5	2.2	1.1	.2	.1	.1
9	.3	.6	.6	.6	.8	20	5	2.2	1.0	.2	.1	.1
10	.3	.6	.6	.7	.7	84	4.9	2.0	1.0	.2	.1	.1
11	.3	.5	.6	.7	.6	193	4.7	2.0	1.0	.1	.1	.1
12	.3	.5	.6	.6	.6	137	4.5	2.0	.8	.2	.1	.1
13	.3	.5	.5	.5	.6	98	4.3	2.0	.7	.3	.1	.1
14	.3	.5	.5	.6	.7	47	4.1	2.0	.7	.4	.1	.1
15	.3	.5	.5	.6	.7	34	3.8	2.0	.7	.4	.1	.1
16	.4	.5	.5	.6	.7	23	3.6	2.0	.7	.3	.2	.1
17	.4	.5	.5	.6	1.3	19	3.4	2.0	.6	.2	.2	.1
18	.4	.5	.5	.6	2.9	16	3.4	1.9	.5	.1	.2	.2
19	.2	.5	.5	.6	1.3	24	3.2	1.9	.5	.1	.2	.2
20	.2	.5	.5	.5	2.3	18	3.2	1.9	.6	.1	.1	.3
21	.1	.5	.5	.5	10	16	3.2	1.9	.7	.1	.1	.3
22	.1	.5	.5	.5	85	12	3.2	1.9	.5	.1	.1	.2
23	.1	.5	.5	.5	13	12	3.4	1.7	.5	.1	.1	.2
24	.1	.5	.5	.5	6.5	10	3.4	1.8	.6	.1	.1	.2
25	.1	.6	.5	.6	17	9.5	3.2	1.8	.7	.1	.1	.2
26	.1	.7	.5	.7	11	9	3.4	1.8	.7	.1	.1	.1
27	.2	.7	.4	.7	7	8.5	3.1	1.9	.5	.2	.1	.2
28	.2	.6	.4	.6	5.5	8	3.0	1.9	.5	.1	.1	.3
29	.3	.6	.4	.6	.....	7.5	2.8	1.9	.5	.1	.1	.2
30	.3	.6	.4	.6	.....	7	2.6	1.8	.5	.1	.1	.2
31	.3	.....	.4	.6	.....	6.5	.....	1.7	.....	.1	.1	.....

NOTE.—No gage-height record Oct. 4-14 and Dec. 9; discharge interpolated. Shifting-control method used Feb. 21.

Monthly discharge of Fish Creek near Duarte, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 6.5 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	0.4	0.1	0.23	0.035	0.04	14.1
November	1.3	.1	.51	.078	.09	30.3
December	.7	.4	.53	.082	.09	32.6
January	.7	.4	.55	.085	.10	33.8
February	85	.6	6.20	.954	.99	344
March	193	2.6	33.4	5.14	5.93	2,050
April	6.5	2.6	4.28	.658	.73	255
May	2.4	1.7	1.98	.305	.35	122
June	1.7	.5	.85	.131	.15	50.6
July	.6	.1	.21	.032	.04	12.9
August	.2	.1	.11	.017	.02	6.8
September	.3	.1	.15	.023	.03	8.9
The year	193	.1	4.10	.631	8.56	2,960

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SAWPIT CREEK NEAR MONROVIA, CALIF.

LOCATION.—In SE. ¼ NW. ¼ sec. 13, T. 1 N., R. 11 W., at highway bridge just below junction of two main branches, 2 miles north of Monrovia, Los Angeles County.

DRAINAGE AREA.—5.3 square miles (measured on topographic map).

RECORDS AVAILABLE.—November 8, 1916, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder, on left bank at east end of highway bridge.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading near gage.

CHANNEL AND CONTROL.—Bed consists of coarse gravel and boulders; apparently permanent. Channel is straight for 25 feet above gage and curved below; banks are high. A concrete boulder dam was built across channel just below gage for an artificial control. Lowest point in this control is at elevation of 0.70 foot on gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.65 feet at midnight March 10–11 (discharge from extension of rating curve about 256 second-feet); stream dry October 1 to February 21 and April 20 to September 30.

1916–1918: Maximum stage recorded, 2.65 feet March 10, 1918 (discharge, 256 second-feet); stream dry April 7–16, 1917, April 21, 1917, to February 21, 1918; and April 20 to September 30, 1918.

DIVERSIONS.—Part of the water supply for Monrovia is obtained from the two branches of Sawpit Creek above gage. See record for Monrovia pipe line (p. —).

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent throughout year. A fairly well-defined rating curve, averaging all measurements obtained at this station, was used throughout the year. Daily discharge ascertained by applying to the rating table mean daily gage heights determined by inspecting recorder graph, except for March 7, 10, and 11, when discharge for two-hour intervals was averaged. Records fair.

COOPERATION.—City of Monrovia furnished observer for water-stage recorder.

Discharge measurements of Sawpit Creek near Monrovia, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 25	F. C. Ebert	1.02	1.5	Mar. 20	F. C. Ebert	1.20	5.6
Mar. 11	E. Tompkins	1.74	54	29	do	1.05	1.6
15	C. W. Sopp	1.20	7.0	Apr. 4	C. W. Sopp	1.07	2.3

Daily discharge, in second-feet, of Sawpit Creek near Monrovia, Calif., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.
1		1.4	3.2	11		88	.4	21		5	
2		1.4	3.4	12		34	.4	22	8.2	4.6	
3		1.4	3.2	13		21	1.8	23	2.5	3.7	
4		1.4	2.9	14		12	2.0	24	2.1	3.4	
5		1.4	2.5	15		9	1.8	25	2.9	3.4	
6		2.1	2.3	16		8.5	.8	26	1.5	3.2	
7		49	2.3	17		8.5	.05	27	1.4	3.0	
8		14	2.1	18		8	.03	28	1.6	2.9	
9		7	1.1	19		8	.04	29		2.5	
10		22	.4	20		6.5		30		2.7	
								31		2.9	

NOTE.—No flow Oct. 1 to Feb. 21 and Apr. 20 to Sept. 30.

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Monthly discharge of Sawpit Creek near Monrovia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February	8.2	0.00	.721	40.0
March	88	1.4	11.0	676
April	3.4	.00	1.02	60.7
The year	88	.00	1.08	777

Daily discharge, in second-feet, of Sawpit Creek and Monrovia pipe line near Monrovia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.4	1.5	1.6	1.5	1.6	3.0	5.5	2.7	2.1	1.7	1.3	1.2
2	1.4	1.5	1.6	1.5	1.6	3.0	5.5	2.7	2.1	1.6	1.3	1.2
3	1.4	1.5	1.6	1.5	1.6	3.0	5.5	2.7	2.1	1.6	1.3	1.2
4	1.4	1.5	1.6	1.5	1.6	2.9	4.9	2.7	2.1	1.5	1.3	1.2
5	1.4	1.5	1.6	1.5	1.6	2.9	4.5	2.6	2.1	1.5	1.3	1.2
6	1.4	1.9	1.6	1.5	1.6	4.0	4.4	2.6	2.0	1.5	1.3	1.2
7	1.4	1.7	1.6	1.5	1.6	51	4.7	2.6	2.0	1.5	1.3	1.2
8	1.4	1.7	1.6	1.5	1.6	15	4.5	2.6	1.9	1.5	1.3	1.2
9	1.4	1.6	1.6	1.5	1.6	8	3.9	2.6	1.9	1.5	1.3	1.2
10	1.4	1.6	1.6	1.5	1.6	23	3.7	2.6	1.9	1.4	1.3	1.2
11	1.4	1.5	1.6	1.5	1.6	89	3.7	2.6	2.1	1.4	1.3	1.2
12	1.4	1.6	1.6	1.5	1.6	35	3.7	2.4	2.1	1.4	1.3	1.2
13	1.5	1.6	1.6	1.5	1.6	22	4.4	2.4	1.9	1.4	1.3	1.2
14	1.6	1.6	1.6	1.5	1.5	13	4.1	2.4	1.9	1.4	1.3	1.5
15	1.6	1.6	1.6	1.5	1.5	11	3.9	2.4	1.8	1.4	1.4	1.4
16	1.7	1.6	1.6	1.5	1.5	12	3.4	2.7	1.8	1.4	1.4	1.4
17	1.7	1.6	1.6	1.5	1.5	12	3.0	2.6	1.8	1.4	1.4	1.4
18	1.5	1.6	1.6	1.5	1.9	11	3.0	2.5	1.7	1.4	1.4	1.3
19	1.5	1.6	1.6	1.5	1.6	11	2.8	2.4	1.7	1.4	1.4	1.3
20	1.5	1.6	1.6	1.5	1.8	8	2.8	2.4	1.7	1.4	1.4	1.3
21	1.5	1.6	1.6	1.5	1.9	6.5	2.8	2.4	1.7	1.4	1.4	1.3
22	1.5	1.6	1.6	1.5	10	6.5	2.8	2.4	1.7	1.4	1.3	1.3
23	1.5	1.6	1.5	1.5	4.0	6	2.8	2.4	1.7	1.4	1.3	1.3
24	1.5	1.6	1.5	1.5	3.4	6.5	3.3	2.4	1.7	1.4	1.3	1.3
25	1.5	1.6	1.5	1.5	5	6.5	3.1	2.1	1.7	1.4	1.3	1.3
26	1.5	1.6	1.5	1.5	3.7	6	3.1	2.1	1.7	1.4	1.2	1.3
27	1.5	1.6	1.5	1.5	3.0	5.5	3.1	2.1	1.7	1.4	1.2	1.5
28	1.5	1.6	1.5	1.5	3.2	5.5	2.8	2.1	1.6	1.4	1.2	1.4
29	1.5	1.6	1.5	1.5	.....	5.5	2.8	2.4	1.6	1.4	1.2	1.3
30	1.5	1.6	1.5	1.6	.....	5.5	2.8	2.1	1.6	1.4	1.2	1.3
31	1.5	.....	1.5	1.6	.....	5.5	.....	2.1	.....	1.4	1.2	.....

NOTE.—See page 62 for daily discharge of Monrovia pipe line.

Monthly discharge of Sawpit Creek and Monrovia pipe line near Monrovia, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 5.3 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	1.7	1.4	1.48	0.279	0.32	91.0
November	1.9	1.5	1.60	.302	.34	95.2
December	1.6	1.5	1.57	.296	.34	96.5
January	1.6	1.5	1.51	.285	.33	92.8
February	10	1.5	2.37	.447	.47	132
March	89	2.9	13.1	2.47	2.85	805
April	5.5	2.8	3.71	.700	,78	221
May	2.7	2.1	2.45	.462	.53	151
June	2.1	1.6	1.85	.349	.39	110
July	1.7	1.4	1.44	.272	.31	88.5
August	1.4	1.2	1.30	.245	.28	79.9
September	1.5	1.2	1.28	.252	.27	76.2
The year	89	1.2	2.81	,530	7.21	2,040

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MONROVIA PIPE LINE NEAR MONROVIA, CALIF.

LOCATION.—Near southeast corner of sec. 14, T. 1 N., R. 11 W., 300 feet above settling reservoir at mouth of Sawpit Canyon and 1½ miles north of Monrovia, Los Angeles County.

RECORDS AVAILABLE.—May 18, 1916, to September 30, 1918.

GAGE.—Vertical staff in weir box; read by E. S. Armstrong, canyon guard.

DISCHARGE.—Determined by two rectangular weirs with end contractions; left weir, 2.25 feet long; right weir, 2.26 feet long. Crest of left weir is at zero gage height; crest of right weir is 0.02 foot lower at one end. Rating table has been checked by current-meter measurements made at mouth of intake pipe in weir box.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.40 foot at 5 p. m. March 15 (discharge, 3.7 second-feet); minimum stage, 0.18 foot at 5 p. m. August 26 to September 13 (discharge, 1.1 second-feet).

1916–1918: Maximum stage recorded, 0.49 foot May 18–19, 1916 (discharge, 5.0 second-feet); minimum stage, 0.18 foot August 26 to September 13, 1918 (discharge, 1.1 second-feet).

ACCURACY.—Stage-discharge relation considered permanent since backwater conditions for any stage are probably constant. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—Gage-height record furnished by City of Monrovia.

The Monrovia pipe line furnishes part of the water supply of Monrovia. It obtains its water from two branches of Sawpit Creek. Most of this water is collected by tunnels driven into the sides of the canyon.

Daily discharge, in second-feet, of Monrovia pipe line near Monrovia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.4	1.5	1.6	1.5	1.6	1.6	2.5	2.7	2.1	1.7	1.3	1.2
2	1.4	1.5	1.6	1.5	1.6	1.6	2.1	2.7	2.1	1.6	1.3	1.2
3	1.4	1.5	1.6	1.5	1.6	1.6	2.1	2.7	2.1	1.6	1.3	1.2
4	1.4	1.5	1.6	1.5	1.6	1.5	2.0	2.7	2.1	1.5	1.3	1.2
5	1.4	1.5	1.6	1.5	1.6	1.5	2.0	2.6	2.1	1.5	1.3	1.2
6	1.4	1.9	1.6	1.5	1.6	1.9	2.1	2.6	2.0	1.5	1.3	1.2
7	1.4	1.7	1.6	1.5	1.6	1.7	2.4	2.6	2.0	1.5	1.3	1.2
8	1.4	1.7	1.6	1.5	1.6	1.3	2.4	2.6	1.9	1.5	1.3	1.2
9	1.4	1.6	1.6	1.5	1.6	1.2	2.8	2.6	1.9	1.5	1.3	1.2
10	1.4	1.6	1.6	1.5	1.6	1.3	3.3	2.6	1.9	1.4	1.3	1.2
11	1.4	1.5	1.6	1.5	1.6	1.3	3.3	2.6	2.1	1.4	1.3	1.2
12	1.4	1.6	1.6	1.5	1.6	1.3	3.3	2.4	2.1	1.4	1.3	1.2
13	1.5	1.6	1.6	1.5	1.6	1.2	2.6	2.4	1.9	1.4	1.3	1.2
14	1.6	1.6	1.6	1.5	1.5	1.3	2.1	2.4	1.9	1.4	1.3	1.5
15	1.6	1.6	1.6	1.5	1.5	2.4	2.1	2.4	1.8	1.4	1.4	1.4
16	1.7	1.6	1.6	1.5	1.5	3.3	2.6	2.7	1.8	1.4	1.4	1.4
17	1.7	1.6	1.6	1.5	1.5	3.1	3.0	2.6	1.8	1.4	1.4	1.4
18	1.5	1.6	1.6	1.5	1.9	3.1	3.0	2.5	1.7	1.4	1.4	1.3
19	1.5	1.6	1.6	1.5	1.6	3.0	2.8	2.4	1.7	1.4	1.4	1.3
20	1.5	1.6	1.6	1.5	1.8	1.6	2.8	2.4	1.7	1.4	1.4	1.3
21	1.5	1.6	1.6	1.5	1.9	1.7	2.8	2.4	1.7	1.4	1.4	1.3
22	1.5	1.6	1.6	1.5	2.1	1.7	2.8	2.4	1.7	1.4	1.3	1.3
23	1.5	1.6	1.5	1.5	1.5	2.4	2.8	2.4	1.7	1.4	1.3	1.3
24	1.5	1.6	1.5	1.5	1.3	3.1	3.3	2.4	1.7	1.4	1.3	1.3
25	1.5	1.6	1.5	1.5	2.1	3.1	3.1	2.1	1.7	1.4	1.3	1.3
26	1.5	1.6	1.5	1.5	2.2	2.6	3.1	2.1	1.7	1.4	1.2	1.3
27	1.5	1.6	1.5	1.5	1.6	2.4	3.1	2.1	1.7	1.4	1.2	1.5
28	1.5	1.6	1.5	1.5	1.6	2.6	2.8	2.1	1.6	1.4	1.2	1.4
29	1.5	1.6	1.5	1.5	.....	2.8	2.8	2.4	1.6	1.4	1.2	1.3
30	1.5	1.6	1.5	1.6	.....	2.8	2.8	2.1	1.6	1.4	1.2	1.3
31	1.5	.....	1.5	1.6	.....	2.8	.....	2.1	.....	1.4	1.2	.....

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Monthly discharge of Monrovia pipe line near Monrovia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1.7	1.4	1.48	91.0
November	1.9	1.5	1.60	95.2
December	1.6	1.5	1.57	96.5
January	1.6	1.5	1.51	92.8
February	2.2	1.3	1.66	92.2
March	3.3	1.2	2.09	129
April	3.3	2.0	2.69	160
May	2.7	2.1	2.45	151
June	2.1	1.6	1.85	110
July	1.7	1.4	1.44	88.5
August	1.4	1.2	1.30	79.9
September	1.5	1.2	1.28	76.2
The year	3.3	1.2	1.74	1,260

SANTA ANITA CREEK NEAR SIERRA MADRE, CALIF.

LOCATION.—In SW. ¼ NE. ¼ sec. 10, T. 1 N., R. 11 W., at the head of what are known locally as "Hermits Falls," 4 miles northeast of Sierra Madre, Los Angeles County.

DRAINAGE AREA.—10.5 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 31, 1916, to September 30, 1918.

GAGE.—Stevens water-stage recorder on right bank of pool at head of Hermits Falls.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet below gage or by wading at lower end of gage pool.

CHANNEL AND CONTROL.—Channel at gage is pool in bed rock; bed is rough and steep above and below pool. Banks high, clean, and not subject to overflow. Control is bedrock, the same for all stages, and is permanent. Zero flow, stage 0.47 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.75 feet at 12.30 a. m. March 11 (discharge, 248 second-feet); minimum stage from water-stage recorder, 0.74 foot September 11-12 (discharge, 0.3 second-foot).

1916-1918: Maximum stage recorded, 4.75 feet March 11, 1918 (discharge, 248 second-feet); minimum stage, 0.74 foot September 11-12, 1918 (discharge, 0.3 second-foot).

DIVERSIONS. None above.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Mean daily gage height determined by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table, except February 21-22 and March 7, 10, 11, when hourly discharge was averaged. Records good.

Discharge measurements of Santa Anita Creek near Sierra Madre, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 22	H. J. Tompkins	0.86	0.90	Apr. 9	H. J. Tompkins	1.30	8.5
Jan. 15	Tompkins and Sopp	.89	.95	June 4	do	1.05	2.9
Feb. 26	C. W. Sopp	1.55	19	July 6	do	.91	1.3
Mar. 4	H. J. Tompkins	1.14	3.8	Aug. 2	do	.80	.44
27	do	1.50	15	Sept. 3	do	.77	.55

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Daily discharge, in second-feet, of Santa Anita Creek near Sierra Madre, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.6	0.5	0.8	0.8	0.8	6.4	11	4.3	2.8	1.5	0.6	0.4
2	.6	.5	.8	.8	.8	5.0	11	4.0	2.6	1.4	.6	.4
3	.5	.4	.8	.8	.8	4.5	11	4.0	2.5	1.2	.4	.4
4	.5	.5	.8	.8	.8	4.0	10	4.3	2.6	1.1	.4	.4
5	.5	.6	.8	.8	.8	4.8	9.4	4.5	2.6	1.0	.6	.4
6	.5	1.3	.8	.8	1.0	13	9.1	4.5	2.5	1.0	.6	.4
7	.5	1.0	.8	.8	1.1	114	8.8	4.3	2.4	.9	.6	.4
8	.5	.9	.8	.8	.8	58	8.1	4.3	2.3	.9	.7	.4
9	.5	.8	.8	.8	.8	30	7.8	4.3	2.3	.8	.8	.4
10	.5	.8	.7	.7	.8	62	7.8	4.2	2.1	.8	.8	.4
11	.6	.8	.7	.8	.8	154	7.5	4.0	2.3	.8	.8	.3
12	.8	.9	.7	.8	.9	122	7.5	3.8	2.1	.9	.8	.3
13	.9	.9	.7	1.0	.9	93	8.4	3.5	2.1	1.1	.8	.4
14	1.0	.8	.7	1.0	.9	62	7.2	3.3	1.9	1.2	.8	.8
15	1.0	.8	.7	1.0	.9	47	7.0	3.5	1.9	1.1	.8	.8
16	1.0	.8	.7	1.0	.9	37	6.7	3.6	1.7	.9	.7	.8
17	1.0	.7	.7	.9	1.4	30	6.1	3.6	1.7	.8	.7	.8
18	.7	.7	.6	.9	3.0	26	5.6	3.6	1.8	.6	.7	.7
19	.6	.6	.6	.8	1.8	32	5.0	3.5	1.9	.6	.7	.7
20	.5	.7	.6	.8	3.5	29	5.0	3.3	1.6	.6	.7	.6
21	.5	.7	.6	.8	26	25	4.8	3.3	1.5	.7	.6	.5
22	.5	.7	.7	.8	82	23	5.0	3.2	1.5	.7	.6	.6
23	.5	.8	.8	.8	24	21	5.3	3.2	1.8	.7	.6	6
24	.5	.8	.8	.9	10	19	5.6	3.2	1.8	.8	.6	.6
25	.5	.8	.8	1.1	21	17	5.6	3.2	1.7	.8	.6	.5
26	.6	.8	.8	1.0	18	16	5.6	3.0	1.5	.8	.5	.5
27	.6	.8	.8	1.0	13	15	5.3	3.0	1.4	.8	.5	.9
28	.8	.8	.8	.9	8.4	14	5.3	3.2	1.4	.7	.5	.8
29	.8	.8	.8	.9	.....	13	5.3	3.3	1.4	.6	.5	.7
30	.6	.8	.8	.9	.....	11	4.8	3.0	1.4	.6	.5	.6
31	.6	.....	.8	.8	.....	11	.....	2.9	.....	.5	.5	.....

NOTE.—No gage height record Aug. 14 to Sept. 2; discharge interpolated.

Monthly discharge of Santa Anita Creek near Sierra Madre, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 10.5 square miles].

Month.	Discharge in second-feet.				Run-off	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage	Total in acre-feet.
October	1.0	0.5	0.64	0.061	0.07	39.4
November	1.3	.4	.76	.072	.08	45.2
December	.8	.6	.75	.071	.08	46.1
January	1.1	.7	.86	.082	.09	52.9
February	82	.8	8.07	.769	.80	448
March	154	4.0	36.1	3.44	3.97	2,220
April	11	4.8	7.09	.675	.75	422
May	4.5	2.9	3.64	.347	.40	224
June	2.8	1.4	1.97	.188	.21	117
July	1.5	.5	.87	.083	.10	53.7
August	.8	.4	.63	.060	.07	38.7
September	.9	.3	.55	.052	.06	32.5
The year	154	.3	5.16	.491	6.68	3,740

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LITTLE SANTA ANITA CREEK NEAR SIERRA MADRE, CALIF.

LOCATION.—Near center of W. ½ sec. 9, T. 1 N., R. 11 W., 2 miles northeast of Sierra Madre, Los Angeles County.

DRAINAGE AREA.—1.9 square miles (measured on topographic map).

RECORDS AVAILABLE.—April 15, 1916, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder on left bank about 150 feet below Scherer's cabin.

DISCHARGE MEASUREMENTS.—Made from wooden bridge near gage or by wading.

CHANNEL AND CONTROL.—Bed consists of gravel and boulders; permanent. One channel at all stages; straight for 75 feet above control. Right bank is rock cliff; left bank is stone wall 5 feet high which is probably above maximum stage. Control is small concrete dam, with triangular notch at left end, just below gage. Zero flow, gage height, 0.70 foot, and top of dam, gage height, 1.50 feet.

EXTREMES OF DISCHARGE.—1916–1918: Maximum stage, from water-stage recorder, 2.30 feet at 12.30 a. m. March 10, 1918 (discharge, 58 second-feet); minimum stage, 0.86 foot at 7.30 p. m. September 12, 1918 (discharge, 0.03 second-foot).

DIVERSIONS.—None above.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Water-stage recorder not in operation October 1–6, 18–20, and January 6–16. Mean daily gage heights determined by inspecting water-stage recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table. October 1–6, 18–20, and January 6–16 discharge interpolated. Records good.

Discharge measurements of Little Santa Anita Creek near Sierra Madre, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 24	H. J. Tompkins	1.02	0.10	May 4	H. J. Tompkins	1.30	0.58
Dec. 22	Ernest Tompkins	1.05	.15	16	do	1.30	.65
Feb. 21	C. W. Sopp	1.72	5.0	July 1	C. W. Sopp	1.12	.29
Mar. 11	H. J. Tompkins	1.97	18	Aug. 2	H. J. Tompkins	1.06	.19
28	C. W. Sopp	1.58	2.0	Sept. 23	do	1.02	.18
Apr. 22	H. J. Tompkins	1.34	.86				

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Daily discharge, in second-feet, of Little Santa Anita Creek near Sierra Madre, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.1	0.1	0.2	0.1	0.1	1.0	1.9	0.8	0.6	0.2	0.2	0.05
2	.1	.1	.2	.1	.1	.9	1.9	.7	.6	.2	.1	.05
3	.1	.1	.2	.1	.1	.8	1.7	.7	.6	.2	.1	.05
4	.1	.1	.2	.1	.1	.8	1.6	.7	.6	.2	.1	.1
5	.1	.1	.2	.1	.1	.9	1.5	.8	.5	.2	.1	.1
6	.1	.2	.2	.1	.1	1.4	1.4	.8	.5	.2	.1	.05
7	.1	.2	.2	.1	.2	12	1.3	.8	.5	.2	.1	.05
8	.1	.2	.2	.1	.2	7	1.2	.8	.5	.2	.1	.05
9	.1	.2	.2	.1	.2	3.5	1.2	.8	.5	.2	.1	.05
10	.1	.2	.2	.1	.1	6	1.2	.8	.6	.2	.2	.05
11	.1	.2	.2	.2	.1	23	1.2	.8	.6	.2	.1	.04
12	.1	.2	.2	.2	.1	18	1.2	.7	.6	.2	.1	.04
13	.2	.2	.2	.2	.2	12	1.3	.7	.5	.3	.2	.1
14	.2	.2	.2	.2	.2	8	1.1	.7	.5	.3	.2	.2
15	.2	.2	.2	.2	.2	6	1.1	.7	.5	.3	.2	.2
16	.2	.1	.2	.2	.2	5.5	1.1	.7	.4	.2	.2	.2
17	.2	.1	.2	.2	.2	4.1	1.1	.7	.3	.2	.2	.2
18	.2	.1	.2	.2	5	3.7	1.0	.7	.4	.2	.2	.1
19	.2	.1	.2	.2	5	3.9	.9	.7	.4	.2	.2	.1
20	.1	.1	.2	.2	.5	3.3	.9	.7	.3	.2	.1	.1
21	.1	.1	.2	.1	4.7	2.9	.9	.7	.3	.2	.1	.1
22	.1	.1	.2	.2	12	2.7	.9	.7	.3	.2	.1	.1
23	.1	.1	.2	.2	2.7	2.5	.9	.6	.3	.2	.1	.1
24	.1	.1	.2	.2	1.9	2.3	.9	.7	.3	.2	.1	.1
25	.1	.2	.2	.2	2.0	2.1	.9	.7	.3	.2	.1	.1
26	.1	.2	.2	.2	1.9	2.0	.9	.7	.3	.2	.1	.1
27	.1	.2	.2	.2	1.6	2.0	.9	.7	.3	.2	.1	.2
28	.1	.2	.2	.2	1.2	2.1	.8	.8	.3	.2	.1	.1
29	.1	.2	.2	.2	.....	2.1	.8	.7	.2	.2	.1	.1
30	.1	.2	.1	.2	.....	2.0	.8	.7	.3	.2	.05	.1
31	.1	.....	.1	.2	.....	1.9	.....	.6	.....	.2	.05	.....

NOTE.—No gage-height record Oct. 1–6, 8–20, and Jan. 6–16; discharge interpolated.

Monthly discharge of Little Santa Anita Creek near Sierra Madre, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 1.9 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	0.2	0.1	0.123	0.065	0.07	7.6
November	.2	.1	.153	.081	.09	9.1
December	.2	.1	.194	.102	.12	11.9
January	.2	.1	.165	.087	.10	10.1
February	12	.1	1.14	.600	.62	63.3
March	23	.8	4.72	2.48	2.86	290
April	1.9	.8	1.15	.605	.68	68.4
May	.8	.6	.723	.381	.44	44.5
June	.6	.2	.430	.226	.25	25.6
July	.3	.2	.210	.111	.13	12.9
August	.2	.05	.126	.066	.08	7.7
September	.2	.04	.099	.052	.06	5.9
The year	23	.04	.770	.405	5.50	557

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SAN DIMAS CREEK NEAR SAN DIMAS, CALIF.

LOCATION.—In SW. ¼ NE. ¼ sec. 25, T. 1 N., R. 9 W., at mouth of San Dimas Canyon, 3 miles northeast of San Dimas, Los Angeles County.

DRAINAGE AREA.—18.3 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 3, 1916, to September 30, 1918. (Discharge measurements only April 14 to September 4, 1916.)

GAGE.—Gurley graph water-stage recorder on left bank, at mouth of canyon just above concrete control.

DISCHARGE MEASUREMENTS.—Made from cable about 50 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed consists of sand, gravel, and boulders; shifting. Control is low concrete dam built across channel just below gage well. This dam was raised about 2 feet January 18–23, 1918. Gravel fills in above and below dam affecting stage-discharge relation. Left bank is steep and not subject to overflow; right bank is brushy and is overflowed during high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.09 feet at 4 p. m. March 7 (discharge, 394 second-feet); minimum stage, 2.17 feet, September 7–10 (discharge, 0.1 second-foot).

1916–1918: Maximum stage recorded, 4.90 feet (original datum) December 24, 1916 (discharge, 770 second-feet); stream dry during a part of October and November, 1916.

DIVERSIONS.—None above. The San Dimas Water Co. diverts water for irrigation 150 feet below gage.

ACCURACY.—Stage-discharge relation not permanent throughout year, the changes being due to deposits of gravel above and below concrete control. Rating curves fairly well defined. Discharge March 12–18, April 5–17, and May 8 to June 27 computed by shifting-control method; daily discharge for remainder of year ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph. Records good.

COOPERATION.—San Dimas Water Co. furnished attendant for water-stage recorder.

Discharge measurements of San Dimas Creek near San Dimas, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	H. J. Tompkins	0.68	0.37	Mar. 22	F. C. Ebert	3.15	12
Dec. 7	do	.76	1.5	29	do	2.90	6.8
Jan. 21	C. W. Sopp		1.4	Apr. 4	C. W. Sopp	2.88	6.8
25	Ernest Tompkins	2.53	2.4	8	H. J. Tompkins	2.76	4.1
Feb. 18	C. W. Sopp	2.68	3.3	18	C. W. Sopp	2.71	4.0
21	F. C. Ebert	3.05	7.1	May 7	do	2.67	3.8
22	do	3.85	31	17	do	2.66	2.9
23	do	3.10	9.7	28	do	2.68	2.8
25	C. W. Sopp	2.95	6.9	June 28	do	2.30	.7
Mar. 7	do	4.90	302	July 19	do	2.20	.14
15	H. J. Tompkins	3.80	25	26	H. J. Tompkins	2.20	.19
18	C. W. Sopp	3.22	17	Sept. 4	Ellsworth and Ebert	2.18	[a] .1
20	F. C. Ebert	3.32	15				

[a] Estimated.

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Daily discharge, in second-feet, of San Dimas Creek near San Dimas, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.2	0.3	1.3	1.7	1.7	4.0	7	3.5	3.0	0.6	0.2	0.1
2	.2	.3	1.3	1.7	1.7	3.8	7	3.1	2.8	.6	.2	.1
3	.2	.3	1.4	1.7	1.7	3.4	6.5	2.9	2.7	.6	.2	.1
4	.2	.3	1.4	1.7	1.6	3.1	6.5	3.0	2.5	.6	.2	.1
5	.2	.4	1.4	1.7	1.5	3.4	5.5	3.4	2.3	.5	.2	.1
6	.2	.9	1.4	1.7	1.5	9.5	5	3.5	2.1	.5	.2	1
7	.2	.9	1.5	1.7	1.9	142	4.7	3.5	1.9	.5	.2	.1
8	.2	.8	1.4	1.7	1.8	54	4.4	3.8	1.8	.5	.2	.1
9	.2	.8	1.4	1.7	1.7	31	4.3	3.8	1.7	.4	.2	.1
10	.2	.8	1.5	1.7	1.7	37	4.4	3.6	1.7	.4	.2	.1
11	.3	.8	1.5	1.7	1.4	194	4.8	3.4	1.8	.4	.2	.1
12	.3	.7	1.5	1.7	1.4	80	4.9	3.2	1.7	.4	.2	.1
13	.3	.6	1.6	1.8	1.5	50	6	2.7	1.6	.3	.2	.1
14	.3	.6	1.7	1.8	1.5	31	5.5	2.6	1.5	.3	.2	.2
15	.4	.6	1.7	1.8	1.5	24	5	2.8	1.5	.3	.3	.2
16	.4	.6	1.7	1.8	1.5	25	4.8	2.9	1.5	.3	.3	.2
17	.4	.5	1.7	1.9	1.9	22	4.6	2.9	1.4	.2	.4	.2
18	.3	.6	1.6	1.8	3.5	18	4.1	2.7	1.3	.2	.3	.2
19	.3	.7	1.5	1.6	2.5	20	3.8	2.7	1.3	.2	.2	.1
20	.3	.8	1.5	1.5	2.6	18	3.8	2.8	1.2	.2	.2	.2
21	.3	.8	1.6	1.4	7	14	3.8	2.8	1.1	.2	.2	.3
22	.3	1.0	1.7	1.6	29	12	4.0	2.8	1.0	.2	.2	.3
23	.3	1.1	1.7	1.8	12	11	4.2	2.7	1.0	.2	.2	.3
24	.3	1.3	1.7	2.1	6	11	4.7	2.6	.9	.2	.2	.4
25	.3	1.3	1.7	2.4	8	9.5	5	2.6	.8	.2	.2	.4
26	.3	1.3	1.7	1.9	10	9	5.5	2.6	.8	.2	.2	.5
27	.3	1.3	1.7	1.8	7.5	8.5	5.5	2.6	.7	.2	.2	.5
28	.3	1.3	1.7	1.7	5.5	8	4.8	3.1	.7	.2	.1	.6
29	.3	1.3	1.7	1.6	.....	7.5	4.0	3.5	.7	.2	.1	.6
30	.3	1.2	1.7	1.6	.....	6.5	3.7	3.4	.7	.2	.1	.6
31	.3	.....	1.7	1.7	.....	6.5	.....	3.2	.....	.2	.1	.....

NOTE.—No gage-height record Oct. 1–10, 14–21, 28–31, Nov. 1, 2, 11, Jan. 18–25, May 9–10, 19–21, 30, 31, June 1–7, 16–31, July 1–18, Aug. 3, 4, 25–30, Sept. 15–17, and 29–30; discharge estimated.

Monthly discharge of San Dimas Creek near San Dimas, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 18.3 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	0.4	0.2	0.28	0.015	0.02	17.2
November	1.3	.3	.81	.044	.05	48.2
December	1.7	1.3	1.57	.086	.10	96.5
January	2.4	1.4	1.74	.095	.11	107
February	29	1.4	4.32	.236	.25	240
March	142	3.1	25.4	1.39	1.60	1,560
April	7	3.7	4.93	.269	.30	293
May	3.8	2.6	3.05	.167	.19	188
June	3.0	.7	1.52	.083	.09	90.4
July	.6	.2	.33	.018	.02	20.3
August	.4	.1	.20	.011	.01	12.3
September	.6	.1	.24	.013	.01	14.3
The year	142	.1	3.71	.203	2.75	2,690

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EATON CREEK NEAR PASADENA, CALIF.

LOCATION.—Near line between secs. 2 and 11, T. 1 N., R. 12 W., at mouth of canyon just above Mount Wilson toll bridge, 4 miles northeast of Pasadena, Los Angeles County.

DRAINAGE AREA.—6.5 square miles (measured on topographic map).

RECORDS AVAILABLE.—March 1 to September 30, 1918.

GAGE.—Gurley graph water-stage recorder on left bank just above toll bridge.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during period, from water-stage recorder, 3.47 feet at 4 a. m. March 11 (discharge, 168 second-feet); no flow May 13 to September 30.

DIVERSIONS.—The Precipice Canyon Water Co. diverts above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during period. Rating curve fairly well-defined throughout. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph except on March 7, when hourly discharges were averaged. Records good.

Discharge measurements of Eaton Creek near Pasadena, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 22	C. W. Sopp	1.98	41	Mar. 23	H. J. Tompkins	1.48	10
25	Ernest Tompkins	1.37	8.1	29	do	1.24	4.2
Mar. 1	C. W. Sopp	1.12	2.3	Apr. 5	do	1.20	3.1
4	Ebert and Sopp	.88	.55	12	do	1.10	2.3
11	Sopp and Tompkins	2.44	76	20	do	.98	.85
16	H. J. Tompkins	1.66	18	26	do	.98	1.2

Daily discharge, in second-feet, of Eaton Creek near Pasadena, Calif., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.
1	2.3	3.6	0.25	11	105	2.3	.02	21	13	.7	.....
2	1.9	3.6	.1	12	77	1.9	.01	22	12	.7	.....
3	1.2	3.4	.15	13	63	2.4	.....	23	11	.8	.....
4	.6	3.4	.3	14	41	2.3	.....	24	8.5	.9	.....
5	.7	3.4	.35	15	28	1.8	.....	25	8	1.0	.....
6	4.6	3.3	.25	16	19	1.7	.....	26	7.5	1.0	.....
7	60	3.1	.15	17	17	1.4	.....	27	7	.9	.....
8	38	2.8	.05	18	14	1.1	.....	28	5	.7	.....
9	19	2.4	.05	19	19	1.5	.....	29	4.4	.5	.....
10	36	2.3	.04	20	15	.8	.....	30	4	.4	.....
								31	3.8	.....	.....

NOTE.—Gage-height record started Mar. 1. Discharge Feb. 22 and 24 is same as measurements made on those dates. No flow May 13 to Sept. 30.

Monthly discharge of Eaton Creek near Pasadena, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March	105	0.6	20.9	1,290
April	3.6	.4	1.87	111
May	.35	.00	.055	3.38
The period	.....	.....	.....	1,400

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Monthly discharge of Precipice Canyon Water Co.'s diversion near Pasadena, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet
	Maximum.	Minimum.	Mean.	
March			2.40	148
April			2.00	119
May			2.80	172
June			1.59	95
July			.82	50
August			.54	33
September			.51	30
The period				647

NOTE.—Compiled by engineers of U. S. Geological Survey from records submitted by W. I. Allen, manager of Precipice Water Co.

LOS ANGELES RIVER BASIN.

PACOIMA CREEK NEAR SAN FERNANDO, CALIF.

LOCATION.—In SE. ¼ NE. ¼ sec. 24, T. 3 N., R. 15 W., about 600 feet above mouth of canyon and 4 miles northeast of San Fernando, Los Angeles County.

DRAINAGE AREA.—27.9 square miles (measured on topographic map).

RECORDS AVAILABLE.—March 31, 1916, to September 30, 1918 (not complete).

GAGE.—Gurley graph water-stage recorder on left bank installed December 2, 1916. Previous gage was a staff fastened to a boulder on left bank, 216 feet above water-stage recorder; it was at an independent datum and had a different control.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet above gage well or by wading at gage.

CHANNEL AND CONTROL.—Bed consists of sand, gravel, and boulders; not permanent. Left bank is steep rock cliff; right bank is gentle slope covered with brush and trees. Control is a low boulder and concrete dam built across channel about 7 feet below gage well. Lowest point in control is at elevation of 1.1 feet on gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year from water-stage recorder, 3.10 feet at 1 p. m. March 7 (discharge, 506 second-feet); stream practically dry October 1 to January 11 and June 26 to September 30.

1916–1918: Maximum stage recorded, 4.68 feet December 24, 1916 (discharge, 1,440 second-feet); stream dry July 11, 1917, to January 11, 1918, and June 26 to September 30, 1918.

DIVERSIONS.—None above station. There is a diversion just below control.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent on account of shifting of gravel above control. The four rating curves used during the year are fairly well defined. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph except March 20 to May 19 when, because of shifting control, it was interpolated between measurements. Records fair.

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Discharge measurements of Pacoima Creek near San Fernando, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 28	H. J. Tompkins		0.00	Apr. 3	do	1.80	15
Nov. 17	do		.00	17	do	1.72	8.6
Dec. 30	do	1.23	.03	24	do	1.72	7.2
Feb. 21	Ernest Tompkins	1.70	6.3	May 2	C. W. Sopp	1.70	4.3
27	H. J. Tompkins	1.86	13	6	do	1.66	4.4
Mar. 7	do	3.10	506	20	do	1.65	3.3
8	do	2.31	99	June 5	H. J. Tompkins	1.60	1.7
13	do	2.64	183	22	C. W. Sopp	1.48	.12
20	C. W. Sopp	2.22	52	July 14	H. J. Tompkins		.00
26	H. J. Tompkins	1.84	28				

Daily discharge, in second-feet, of Pacoima Creek near San Fernando, Calif., for the year ending Sept. 30, 1918.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1		0.1	7.5	18	4.5	3.0	1.1
2		.1	6.5	17	4.3	2.7	.7
3		.1	6	15	4.3	2.4	
4		.1	6	14	4.4	1.7	
5		.1	6.5	14	4.4	1.5	
6		.1	11	13	4.4	1.4	
7		.4	191	13	4.2	1.2	
8		.1	88	12	4.1	1.1	
9		.1	44	12	4.0	.9	
10		.0	54	11	3.9	.7	
11		.0	230	11	3.8	.7	
12	0.1	.0	277	10	3.7	.6	
13	.1	.0	165	10	3.6	.4	
14	.1	.0	111	9.5	3.5	.3	
15	.1	.0	85	9	3.4	.1	
16	.1	.0	67	8.5	3.3	.1	
17	.1	.2	61	8.5	3.2	.1	
18	.1	1.5	54	8.5	3.1	.1	
19	.0	.6	56	8	3.0	.1	
20	.0	1.5	52	8	3.0	.1	
21	.0	5	46	7.5	3.0	.1	
22	.0	9.5	44	7.5	3.0	.1	
23	.0	5.5	42	7	3.0	.1	
24	.1	4.4	36	7	3.0	.3	
25	.1	10	32	6.5	3.0	.1	
26	.1	15	28	6.5	3.0	.0	
27	.1	12	25	6	3.0	.0	
28	.1	9.5	24	5.5	3.0	.0	
29	.1		22	5.5	3.0	.0	
30	.1		21	5	3.0	.0	
31	.1		19		3.0		

NOTE.—No flow Oct. 1 to Jan. 11 and July 3 to Sept. 30.

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Monthly discharge of Pacoima Creek near San Fernando, Calif, for the year ending Sept. 30, 1918.

[Drainage area, 27.9 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	0.1	0.0	0.05	0.0018	0.002	3.1
February	15	.0	2.75	.099	.10	153
March	277	6	61.9	2.22	2.56	3,810
April	18	5	9.80	.351	.39	583
May	4.5	3.0	3.52	.126	.15	216
June	3.0	.0	.66	.024	.03	29.4
July	1.1	.0	.06	.0022	.003	3.7
The year	277	.0	6.63	.238	3.23	4,800

TUJUNGA CREEK NEAR SUNLAND, CALIF.

LOCATION.—Approximately in center of sec. 32, T. 3 N., R. 13 W. (unsurveyed), at a partly constructed and abandoned dam, 2 miles above mouth of canyon and 4 miles northeast of Sunland, Los Angles County.

DRAINAGE.—106 square miles (measured on topographic map).

RECORDS AVAILABLE.—October 28, 1916, to September 30, 1918. (Discharge measurements only, April 1 to August 27, 1916.)

GAGE.—Stevens water-stage recorder at right end of dam.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet below gage or by wading at various sections near dam.

CHANNEL AND CONTROL.—Bed consists of gravel and boulders. Control in concrete dam, which has a notch in center about 20 feet long and 1 foot deep, with a steel angle set in the notch near downstream face. Zero flow; gage heigth 0.45 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.25 feet at 2 a. m. March 11 (discharge, determined from extensions of rating curve, about 1,760 second-feet); minimum stage from water-stage recorder, 0.48 foot October 5–11 (discharge, 0.3 second-foot).

1916–1918: Maximum stage recorded, 3.35 feet December 24, 1916 (discharge, from revised rating curve defined by measurements in 1918, 1,960 second-feet); minimum stage, 0.47 foot August 29, 1917 (discharge, 0.2 second-foot).

DIVERSIONS.—Two or three ranches divert a part of the low-water flow for irrigation above the station. There are two small diversions between gage and mouth of canyon.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Frequent discharge measurements have been made and rating curve is well defined below 1,000 second-feet. Operation of water-stage recorder generally satisfactory. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph. High-water records fair; other records good.

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Discharge measurements of Tujunga Creek near Sunland, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 20	Ernest Tompkins	0.59	3.3	May 2	H. J. Tompkins	0.90	21
Jan. 22	C. W. Sopp	.60	4.2	15	do	.87	17
Feb. 16	H. J. Tompkins	.62	4.4	27	C. W. Sopp	.82	16
22	do	2.57	576	June 7	do	.72	9.6
Mar. 3	C. W. Sopp	1.12	38	22	do	.64	5.8
8	H. J. Tompkins	2.35	302	July 3	H. J. Tompkins	.60	3.3
26	C. W. Sopp	1.55	82	21	C. W. Sopp	.52	1.3
Apr. 6	H. J. Tompkins	1.23	50	Sept. 2	H. J. Tompkins	.49	.9
17	do	1.07	33				

Daily discharge, in second-feet, of Tujunga Creek near Sunland, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.5	1.9	4.4	3.6	4.9	47	56	24	12	6	0.5	0.4
2	.4	1.9	5.5	3.6	4.9	41	57	21	10	5.5	.5	.4
3	.4	2.2	6.0	4.0	4.9	37	55	20	12	4.0	.4	.4
4	.4	2.6	6.0	4.0	4.9	33	52	20	11	3.3	.4	.4
5	.3	3.0	5.5	4.4	4.4	34	32	20	10	3.0	.5	.4
6	.3	6.0	4.9	4.4	4.4	59	48	22	10	2.2	.5	.4
7	.3	6.5	3.6	4.4	6	550	47	23	9.5	1.9	.4	.4
8	.3	6.0	3.6	4.9	5.5	420	44	24	8.5	1.6	.5	.4
9	.3	5.5	4.0	5.5	4.9	148	42	24	8	1.6	.4	.4
10	.3	4.9	4.0	4.0	4.4	199	40	24	7.5	1.6	.4	.4
11	.3	4.9	4.0	4.4	4.4	1,050	38	19	8.5	1.6	.4	.4
12	.4	4.9	4.0	4.4	4.9	1,150	37	17	8	1.2	.4	.4
13	.5	4.4	4.0	5.5	4.9	1,100	38	18	7.5	1.6	.4	.4
14	.8	4.4	4.0	5.5	4.9	704	36	17	7	1.9	.4	.5
15	.8	4.0	4.4	5.5	4.9	340	34	17	7	1.9	.5	.5
16	.5	4.0	4.4	4.9	4.9	183	33	15	6.5	1.6	.4	.5
17	.5	3.6	4.4	5.5	7	147	32	19	6.5	.8	.4	.5
18	.4	3.3	4.4	4.9	16	131	30	19	6	.8	.4	.5
19	.3	2.6	4.4	4.0	12	159	27	19	7.5	.5	.4	.5
20	.4	2.2	4.4	4.0	20	140	27	19	8	.5	.5	.5
21	.4	2.6	3.6	4.0	104	128	26	19	6	1.2	.5	.5
22	.5	2.6	3.6	4.0	340	120	27	19	6	1.2	.5	.8
23	.5	2.6	3.6	4.4	123	107	27	19	6	1.2	.5	.8
24	.5	2.6	3.6	4.4	74	100	28	18	6	1.2	.5	.8
25	1.2	3.3	3.6	4.9	10.6	87	28	19	6	1.2	.5	1.2
26	1.2	3.6	3.6	5.5	133	80	29	21	5.5	.8	.5	1.2
27	1.6	3.6	3.6	4.9	85	74	29	17	4.4	.8	.5	2.2
28	2.2	3.6	3.3	4.4	62	70	27	19	4.0	.5	.5	3.6
29	1.9	3.3	3.0	4.9	.....	63	26	19	4.0	.5	.4	2.6
30	2.2	3.6	3.3	5.5	.....	59	24	16	4.0	.5	.4	2.2
31	2.2	.....	3.6	5.5	.....	58	.....	14	.....	.5	.4	.....

NOTE.—No gage-height record June 4–6 and 22; discharge estimated.

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Monthly discharge of Tujunga Creek near Sunland, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 106 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	2.2	0.3	0.74	0.0070	0.008	45.5
November	6.5	1.9	3.67	.035	.04	218
December	6	3.0	4.14	.039	.04	255
January	5.5	3.6	4.64	.044	.05	285
February	340	4.4	41.4	.391	.41	2,300
March	1,150	33	246	2.32	2.68	15,100
April	57	24	35.9	.339	.38	2,140
May	24	14	19.4	.183	.21	1,190
June	12	4.0	7.43	.070	.08	442
July	6	.5	1.70	.016	.02	105
August	.5	.4	.45	.0042	.005	27.7
September	3.6	.4	.82	.0077	.009	48.8
The year	1,150	.3	30.6	.289	3.93	22,200

HAINES CREEK NEAR TUJUNGA, CALIF.

LOCATION.—In NE. ¼ NE. ¼ sec. 18, T. 2 N., R. 13 W., 800 feet above mouth of canyon and 1½ miles northeast of Tujunga, Los Angeles County.

DRAINAGE AREA.—1.2 square miles (measured on topographic map).

RECORDS AVAILABLE.—February 7, 1917, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder on right bank, just above concrete control, 800 feet above mouth of canyon.

DISCHARGE MEASUREMENTS.—Made by volumetric method when discharge was very small, and on crest of dam. A bridge has been built 4 feet above dam for use during high water.

CHANNEL AND CONTROL.—Bed consists of boulders and gravel overlying solid rock; permanent; banks are high and fairly clean. A concrete dam, having a maximum height of about 5 feet above bed rock, was built across the channel at downstream face of gage well. A 12-foot concrete wing wall was constructed at left end of dam. Crest of dam has a trapezoidal notch 6 inches wide on bottom and 1 foot deep, which makes control more sensitive for low stages. Zero flow, gage-height 0.25 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 1.37 feet at 11 p. m. March 10 (discharge, 6.8 second-feet); minimum stage from water-stage recorder, 0.32 foot October 1–3 and August 25 to September 12 (discharge 0.03 second-foot).

1917–1918: Maximum stage recorded, 1.37 feet March 10, 1918 (discharge, 6.8 second-feet); minimum stage, 0.32 foot September 20–30 and October 1–3, 1917 and August 25 to September 12, 1918 (discharge, 0.03 second-foot).

DIVERSIONS.—About a mile above the station a tunnel has been driven into the stream bed and a 4-inch pipe carries the water past the gage. This water is used for domestic supply at Tujunga. A similar tunnel, a short distance below the station, obtains a small supply during the greater part of the year.

REGULATION.—A large number of small check dams, constructed of brush and boulders have been built across the stream channel in the upper part of the drainage basin.

ACCURACY.—Stage-discharge relations permanent. Rating curve fairly well defined. Operation of water-stage recorder satisfactory throughout the year. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting gage-height graph, except February 21–22 and March 7 and 10 when discharge for two-hour intervals was averaged. Records good.

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Discharge measurements of Haines Creek near Tujunga, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 15	H. J. Tompkins	0.36	0.06	Mar. 13	Ernest Tompkins	1.17	3.9
Feb. 22	Ernest Tompkins	.81	1.1	20	H. J. Tompkins	.88	1.7
Mar. 7	do	1.12	3.0	Apr. 10	C. W. Sopp	.65	.6
11	C. W. Sopp	1.09	3.4	Sept. 17	H. J. Tompkins	.34	.05

Daily discharge, in second-feet, of Haines Creek near Tujunga, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.03	0.05	0.06	0.06	0.07	0.45	0.8	0.29	0.20	0.18	0.05	0.03
2	.03	.05	.06	.06	.09	.43	.8	.31	.18	.15	.04	.03
3	.03	.05	.07	.06	.09	.41	.75	.31	.17	.14	.04	.03
4	.04	.05	.07	.06	.07	.37	.7	.31	.17	.14	.04	.03
5	.04	.05	.07	.06	.07	.31	.7	.31	.17	.12	.04	.03
6	.04	.09	.07	.06	.07	.25	.7	.31	.17	.12	.04	.03
7	.04	.09	.07	.06	.07	1.3	.65	.31	.17	.11	.04	.03
8	.04	.07	.07	.06	.06	.7	.65	.31	.17	.11	.04	.03
9	.04	.07	.07	.06	.06	.65	.6	.31	.18	.11	.04	.03
10	.04	.07	.07	.06	.06	1.5	.6	.29	.23	.11	.04	.03
11	.04	.07	.07	.06	.06	3.2	.5	.27	.23	.11	.04	.03
12	.04	.07	.07	.06	.06	4.7	.5	.27	.22	.11	.04	.03
13	.04	.06	.07	.06	.06	4.2	.47	.25	.20	.11	.04	.04
14	.04	.06	.07	.06	.06	3.3	.45	.23	.20	.11	.04	.05
15	.04	.06	.06	.07	.06	2.6	.45	.23	.20	.11	.05	.04
16	.04	.06	.06	.07	.06	2.1	.45	.23	.20	.10	.06	.04
17	.05	.07	.06	.07	.10	1.8	.43	.23	.15	.10	.06	.04
18	.05	.07	.06	.07	.10	1.6	.43	.23	.17	.09	.06	.04
19	.05	.06	.06	.07	.10	2.0	.41	.23	.17	.06	.06	.04
20	.04	.06	.06	.07	.12	1.6	.39	.23	.15	.06	.06	.04
21	.04	.06	.06	.06	.31	1.4	.37	.23	.15	.06	.06	.04
22	.04	.07	.06	.06	1.4	1.4	.35	.23	.17	.06	.05	.04
23	.04	.07	.06	.06	.37	1.3	.35	.23	.15	.06	.04	.04
24	.04	.07	.06	.06	.45	1.2	.35	.23	.17	.06	.04	.04
25	.04	.07	.06	.06	.6	1.2	.35	.23	.17	.06	.03	.04
26	.04	.06	.06	.07	.55	1.1	.35	.23	.14	.06	.03	.04
27	.05	.06	.06	.07	.5	1.0	.33	.23	.14	.06	.03	.04
28	.04	.06	.06	.07	.47	.95	.31	.23	.15	.06	.03	.04
29	.04	.06	.06	.07	.....	.95	.31	.23	.15	.06	.03	.04
30	.05	.06	.06	.06	.....	.85	.29	.23	.15	.06	.03	.04
31	.05	.....	.06	.07	.....	.8	.....	.22	.....	.05	.03	.....

NOTE.—No gage-height record May 4–8; discharge interpolated.

Monthly discharge of Haines Creek near Tujunga, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0.05	0.03	0.041	2.52
November	.09	.05	.064	3.81
December	.07	.06	.064	3.94
January	.07	.06	.064	3.94
February	1.4	.06	.219	12.2
March	4.7	.25	1.47	90.4
April	.8	.29	.493	29.3
May	.31	.22	.257	15.8
June	.23	.14	.175	10.4
July	.18	.05	.094	5.78
August	.06	.03	.042	2.58
September	.05	.03	.036	2.14
The year	4.7	.03	0.253	183

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ARROYO SECO NEAR PASADENA, CALIF.

LOCATION.—Near south line of sec. 30, T. 2 N., R. 12 W. (unsurveyed), just below trail crossing at forest ranger's station, in Angeles National Forest, 1½ miles above mouth of Millard Canyon, 3 miles above Devil's gate, and 5½ miles northwest of Pasadena, Los Angeles County.

DRAINAGE AREA.—16.4 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 1, 1910, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder installed September 30, 1916, on right bank just upstream from original staff gage. Original datum was not maintained.

DISCHARGE MEASUREMENTS.—Made from cable 115 feet below control or by wading.

CHANNEL AND CONTROL.—Bed consists of solid rock, gravel, and boulders. A concrete dam, extending to bedrock, was built across channel 15 feet below gage well. There is a notch in the crest 2 feet wide and 1 foot deep.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.10 feet at 11 p. m. March 10 (discharge, 1,030 second-feet); minimum stage from water-stage recorder, 0.77 foot at 5 p. m. October 7 (discharge, 0.07 second-foot).

1910–1918: Maximum stage recorded, 12.5 feet February 20, 1914 (discharge, from extension of rating curve, 5,630 second-feet); minimum stage recorded, 0.77 foot October 7, 1917 (discharge, 0.07 second-foot).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent throughout the year on account of shifting of gravel above control. The two rating curves used are well defined below 700 second-feet. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspection of recorder graph except March 7 and 10 when hourly discharge was averaged. Records good.

Discharge measurements of Arroyo Seco near Pasadena, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	Ernest Tompkins	0.94	0.33	Mar. 30	C. W. Sopp	2.00	14
Dec. 21	H. J. Tompkins	1.08	.85	Apr. 13	H. J. Tompkins	1.92	10
Jan. 22	C. W. Sopp	1.12	1.0	May 6	do	1.72	4.8
Feb. 21	do	2.50	71	10	C. W. Sopp	1.73	4.9
22	do	2.90	129	June 5	H. J. Tompkins	1.56	2.3
Mar. 7	Ernest Tompkins	3.64	578	21	C. W. Sopp	1.50	1.2
16	C. W. Sopp	2.40	46	July 22	H. J. Tompkins	1.35	.34
23	do	2.15	24				

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Daily discharge, in second-feet, of Arroyo Seco near Pasadena, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.1	0.2	0.9	0.9	1.1	9.5	13	4.9	2.9	1.4	0.2	0.2
2	.1	.2	.9	.9	1.1	8	14	4.4	2.6	1.3	.2	.2
3	.1	.2	.9	.9	1.1	7	13	4.2	2.5	1.2	.2	.2
4	.1	.4	.9	1.0	1.1	6	13	4.2	2.5	1.1	.2	.2
5	.1	.4	.9	.8	1.1	6.5	12	4.4	2.4	1.0	.2	.2
6	.1	.6	.9	.8	1.1	13	12	4.7	2.3	.9	.2	.2
7	.1	.5	.9	.8	1.5	246	12	4.7	2.2	.7	.2	.2
8	.1	.5	.9	.9	1.1	65	11	5.5	2.2	.6	.2	.2
9	.1	.4	.8	.9	1.0	32	11	5.5	1.9	.5	.2	.2
10	.1	.4	.8	.9	1.0	172	11	5	1.8	.4	.3	.2
11	.1	.5	.8	1.0	1.0	342	10	4.7	1.9	.4	.3	.2
12	.2	.5	.8	1.0	1.0	314	10	3.9	1.8	.5	.3	.2
13	.3	.5	.8	1.3	1.0	160	10	3.7	1.7	.6	.3	.2
14	.3	.5	.9	1.1	1.0	86	9	3.6	1.6	.6	.4	1.1
15	.4	.5	.8	1.1	1.0	59	8.5	3.4	1.5	.6	.5	.7
16	.4	.6	.9	1.1	1.0	46	8	3.6	1.4	.5	.5	.6
17	.4	.5	.9	1.1	1.7	38	7.5	3.7	1.4	.5	.5	.6
18	.3	.5	.9	1.1	3.4	32	7	3.7	1.3	.4	.4	.5
19	.3	.5	.9	1.0	2.4	44	6.5	3.7	1.5	.4	.4	.5
20	.2	.5	.9	1.1	3.9	40	6.5	3.6	1.5	.4	.4	.5
21	.2	.5	.9	1.1	45	33	6.5	3.6	1.5	.3	.4	.5
22	.2	.5	.9	1.1	107	28	7	3.6	1.4	.3	.3	.5
23	.2	.5	.9	1.1	32	24	7	3.4	1.4	.4	.3	.5
24	.2	.6	.9	1.0	17	20	7	3.4	1.3	.3	.3	.5
25	.2	.7	.9	1.1	27	19	7	3.4	1.3	.3	.2	.5
26	.2	.9	.9	1.1	32	18	7	3.4	1.2	.4	.2	.5
27	.3	.8	.9	1.1	19	17	7	3.2	1.1	.4	.2	.6
28	.3	.9	.9	1.1	17	16	7	3.9	1.1	.3	.2	.6
29	.3	1.0	1.0	1.1	.....	15	6.5	3.6	1.0	.3	.2	.4
30	.3	.9	1.0	1.1	.....	14	5.5	3.4	1.1	.2	.2	.4
31	.3	.....	1.0	1.1	.....	14	.....	3.1	.....	.2	.2	.....

NOTE.—No gage-height record Oct. 1-5, 18, 19, 26 and Sept. 24-27; discharge estimated.

Monthly discharge of Arroyo Seco near Pasadena, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 16.4 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	0.4	0.1	0.213	0.013	0.01	13.1
November	1.0	.2	.540	.033	.04	32.1
December	1.0	.8	.890	.054	.06	54.7
January	1.3	.8	1.02	.062	.07	62.7
February	107	1.0	11.6	.707	.74	644
March	342	6	62.7	3.82	4.40	3,860
April	14	5.5	9.08	.554	.62	530
May	5.5	3.1	3.97	.242	.28	244
June	2.9	1.0	1.71	.104	.12	102
July	1.4	.2	.561	.034	.04	34.4
August	.5	.2	.284	.017	.02	17.5
September	1.1	.2	.403	.025	.03	24.0
The year	342	.1	7.77	.474	6.43	5,620

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SANTA CLARA RIVER BASIN.

SESPE CREEK NEAR SESPE, CALIF.

LOCATION.—At Bradfield's camp, in Santa Barbara National Forest, three-fourths of a mile below mouth of West Fork of Sespe Creek, 4½ miles above intake of Fillmore canal, and about 6½ miles northwest of Sespe, Ventura County.

DRAINAGE AREA.—216 square miles (measured by Ralph Bennett, consulting engineer).

RECORDS AVAILABLE.—October 1, 1915, to September 30, 1918, when station was discontinued.

GAGE.—Painted on large boulder and on rock cliff on left bank; read by G. H. Killgore.

DISCHARGE MEASUREMENTS.—Make from cable 250 feet above gage or by wading.

CHANNEL AND CONTROL.—Gravel and large boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.7 feet (only one reading and time not given) February 22 (discharge, 7,500 second-feet); minimum stage recorded, 4.33 feet October 4–6, record not complete (discharge, 3.6 second-feet).

1915–1918: Maximum stage recorded, 18.7 feet January 17, 1916 (discharge, 18,600 second-feet); minimum stage, 4.33 feet during September and October, 1917 (discharge, 3.6 second-feet).

ACCURACY.—Stage-discharge relation not permanent. Fairly well-defined rating curves used October 1 to February 22 and February 23 to March 7. Gage read to hundredths; number of readings a day not known. Daily discharge ascertained by applying reported gage height to rating table by interpolation (March 24 to April 5 and June 16 to August 3) or, by means of curves drawn through measurements covering short periods (March 8–23, April 6 to 15, and September 8–30). Records October 1 to March 7, good; other records fair.

COOPERATION.—Gage-height records and nearly all discharge measurements furnished by Sespe Light & Power Co.

Discharge measurements of Sespe Creek near Sespe, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	J. F. Waggoner	4.34	3.9	July 7	J. F. Russell	4.75	53
14	do	4.36	4.3	14	do	4.70	51
Feb. 2	J. F. Russell	4.44	9.4	21	do	4.65	48
10	do	4.47	8.4	28	do	4.65	45
15	do	4.48	7.5	Aug. 2	F. C. Ebert	4.60	17
Mar. 1	do	7.20	421	4	J. F. Russell	4.60	17
9	do	8.20	623	11	do	4.86	16
16	do	8.40	475	18	do	4.90	17
24	do	8.50	433	25	do	4.84	17
30	do	7.60	303	Sept. 1	do	4.83	17
Apr. 6	do	6.80	185	8	do	4.70	15
June 16	do	5.10	57	15	do	5.03	25
23	do	4.85	54	22	do	4.78	17
30	do	4.75	52				

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Daily discharge, in second-feet, of Sespe Creek near Sespe, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.8	.....	6	440	269	111	74	52	23	17
2	3.8	.....	6	440	252	111	74	52	17	17
3	3.8	.....	6	405	235	104	71	52	17	17
4	3.6	.....	6	370	218	97	71	53	17	16
5	3.6	.....	6	405	201	100	68	53	17	16
6	3.6	.....	5.5	1,800	185	97	68	53	17	16
7	3.8	.....	6	6,350	195	94	66	53	17	15
8	3.8	.....	6	1,370	193	94	64	53	16	15
9	4.0	.....	6	623	192	97	64	53	16	15
10	4.0	.....	6.5	6,350	190	90	61	52	16	15
11	4.2	.....	6.5	1,940	191	83	61	52	16	15
12	4.2	.....	6	4,130	175	83	57	51	16	15
13	4.2	.....	6	1,700	165	77	57	51	16	29
14	4.2	.....	6	1,070	159	77	57	51	16	27
15	.....	.....	6.5	600	155	80	53	51	17	25
16	.....	.....	7	475	153	80	57	50	17	24
17	.....	.....	7	365	149	77	56	50	17	22
18	.....	.....	25	335	145	74	56	49	17	21
19	.....	.....	15	3,220	135	71	55	49	17	21
20	.....	.....	615	1,450	127	71	55	48	17	18
21	.....	.....	2,320	690	127	74	54	48	17	18
22	.....	.....	7,500	645	119	77	54	48	17	17
23	.....	.....	905	515	111	77	54	47	17	16
24	.....	.....	370	433	111	74	54	47	17	16
25	.....	6	1,800	410	104	71	53	46	17	16
26	.....	6	1,020	385	97	74	53	46	17	16
27	.....	5.5	628	360	97	74	53	45	17	35
28	.....	5.5	480	340	90	71	52	45	17	31
29	.....	5.5	.....	320	94	71	52	39	17	29
30	.....	6	.....	303	100	74	52	33	17	28
31	.....	6	.....	286	.....	71	.....	28	17	.....

NOTE.—No gage-height record Oct. 15 to Jan. 24.

Monthly discharge of Sespe Creek near Sespe, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 216 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October 1-14	4.2	3.6	3.90	0.018	0.01	108
January 25-31	6	5.5	5.79	.027	0.01	80.4
February	7,500	5.5	564	2.61	2.72	31,300
March	6,350	286	1,240	5.74	6.62	76,200
April	269	90	158	.731	.82	9,400
May	111	71	83.1	.385	.44	5,110
June	74	52	59.2	.274	.31	3,520
July	53	28	48.4	.224	.26	2,980
August	23	16	17.0	.079	.09	1,050
September	35	15	19.9	.092	.10	1,180

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CARPINTERIA CREEK BASIN.

GOBERNADOR CREEK NEAR CARPINTERIA, CALIF.

LOCATION.—In SW. ¼ SW. ¼ sec. 14, T. 4 N., R. 25 W., 1,000 feet below junction of Eldorado and Steer creeks and 3¼ miles northeast of Carpinteria, Santa Barbara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 24, 1916, to September 30, 1918 (not complete).

GAGE.—Vertical staff in two sections on left bank; read by K. C. Lillingston. A temporary gage was used June 24 to September 11, 1916; datum 1.11 feet lower.

DISCHARGE MEASUREMENTS.—Made from cable 150 feet below gage or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; shifts. Banks are high, clean, and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, from high-water mark, 3.0 feet February 22 (discharge, 138 second-feet); minimum stage recorded, 1.08 feet during October, November, December, August, and September (discharge, 1.1 second-feet).

1916–1918: Maximum stage recorded, 3.5 feet February 21, 1917 (discharge, 200 second-feet); minimum stage, 1.26 feet August 31, 1916 (discharge, 0.8 second-foot).

DIVERSIONS.—None above. The Gobernador Water Co. diverts water at its submerged dam 1 mile below station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed about February 22. Two rating curves were used: October 1 to February 22, well defined; February 23 to September 30, fairly well defined. Gage read to hundredths occasionally. Daily discharge ascertained by applying gage height to rating table. Records considered good.

COOPERATION.—Gage-height record furnished by K. C. Lillingston.

Discharge measurements of Gobernador Creek near Carpinteria, Calif., during the year ending Sept. 30, 1918.

[Made by F. C. Ebert.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 30	1.22	0.8	May 25	1.22	3.1
Apr. 11	1.30	6.5	Aug. 1	1.10	1.2

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Daily discharge, in second-feet, of Gobernador Creek near Carpinteria, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1				1.6	2.2							
2											1.2	
3					2.2					2.3	1.2	
4								5.5				
5		1.1		1.5	2.2					2.3		
6		1.8				22			3.1			
7			1.1									1.1
8			1.1	1.8	2.2				3.1			
9						15					1.6	
10										2.0		1.1
11	1.3				2.2			4.9				
12		1.5	1.1									
13	1.5						6		2.7	2.3	1.4	
14					2.2							
15	1.5			2.5				4.3	2.7			
16		1.5			2.2	15						1.2
17		1.5									1.8	
18								4.3	2.7	2.3		
19					2.2							
20						40				2.0		
21						29						1.2
22			1.5	2.2		26			2.7			
23					13	18					1.2	
24												
25					10	14		3.7		2.0		
26	1.1			2.5								
27					6	10						
28								3.1	2.3			2.0
29			1.5				5.5		2.3		1.1	
30	1.1	1.1		2.2								
31											1.2	

NOTE.—No gage-height record on days for which discharge is not given.

SANTA YNEZ RIVER BASIN.

SANTA YNEZ RIVER NEAR SANTA BARBARA, CALIF.

LOCATION.—About on line between secs. 10 and 11, T. 5 N., R. 27 W., at Gibraltar dam site, just above mouth of Devil Canyon Creek and about 7 miles north of Santa Barbara, Santa Barbara County. Mono Creek enters 3¼ miles above station.

DRAINAGE AREA.—218 square miles at site used previous to August 2, 1916 (measured on topographic maps).

RECORDS AVAILABLE.—November 1, 1903, to April 30, 1907; October 1, 1907, to January 31, 1908; February 6, 1910, to November 24, 1918, when station was discontinued. Station was maintained about 4¾ miles above present site January 1 to June 20, 1903.

GAGE.—Friez water-stage recorder on left bank at portal of tunnel 50 feet above base of Gibraltar dam, August 2, 1916. Two temporary staff gages above the dam used from June 1 to November 24, when the water-stage recorder was removed. Previous gage was a staff in three sections about 900 feet below north portal of the Santa Barbara water-supply tunnel. April 13, 1911, gage datum was lowered 5.00 feet.

DISCHARGE MEASUREMENTS.—Made from cable at old gage or by wading at various sections.

CHANNEL AND CONTROL.—Bed consists of sand and gravel; shifts greatly during extreme high water; relatively permanent at low water. Control, which is base of Gibraltar dam, is satisfactory except for periods when flash boards and sand bags are placed on crest. Controls for temporary gages shift considerably.

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EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.45 feet at 9 p. m. March 10 (discharge, from extension of rating curve, about 9,090 second-feet); minimum stage unknown account of incomplete record.

1904–1918: Maximum stage recorded, 23.0 feet at 8 p. m. January 25, 1914 (discharge, 13,100 second-feet); no flow during most of July to September, 1904, and a part of September, 1916.

DIVERSIONS.—City of Santa Barbara diverts water at gage for municipal use. The record includes this diversion.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent February 19 to May 31. From January 19 to February 18 sand bags on dam were in use and changes were frequently made. The gage was removed May 1 and temporary gages installed 700 feet upstream. Rating curve used February 19 to May 31 well defined below 2,000 second-feet and is extended above. No rating curves were developed for the period when sand bags were on the dam or when temporary gages were used. Temporary gages read to hundredths twice daily. Mean daily gage height determined by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table except January 19 to February 18 and June 1 to November 24, when the shifting-control method was used. Records good except those for high water, which are fair.

COOPERATION.—Gage-height records and most of discharge measurements furnished by City of Santa Barbara.

Discharge measurements of Santa Ynez River near Santa Barbara, Calif., during the period.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec-ft.*
Jan. 19	Elmer Gilchrest	1.98	1.0	July 1	F. S. Pinkham	2.62	13
26	do	2.32	2.7	3	do	2.48	11
29	do	2.16	1.4	5	do	2.47	10
Feb. 9	do	2.18	1.8	8	do	2.43	6.4
12	do	2.10	1.9	10	do	2.42	5.6
18	do	2.46	6.2	12	do	2.42	5.0
Mar. 11	Haskell and Browning	5.15	1,730	15	do	2.40	4.3
21	Haskell and Gilchrest	4.45	1,070	17	do	2.38	4.3
Apr. 3	F. S. Pinkham	3.27	271	19	do	2.38	4.0
5	do	3.16	222	22	P. Romero	2.35	3.9
10	F. C. Ebert	3.04	175	24	do	2.34	3.5
12	F. S. Pinkham	2.98	175	26	do	2.34	3.8
15	do	2.92	147	29	do	2.34	3.5
17	do	2.88	132	31	F. C. Ebert	2.32	2.9
19	do	2.85	124	31	P. Romero	2.33	3.5
22	do	2.80	110	Aug. 1	do	2.31	2.8
24	do	2.78	100	5	do	2.30	2.5
26	do	2.76	96	7	do	2.30	2.5
29	do	2.74	89	9	do	2.30	2.3
May 1	do	2.71	78	12	do	2.29	3.0
3	do	2.69	72	14	do	2.30	2.9
6	do	2.68	66	16	C. Codero	2.32	4.3
8	do	2.68	63	19	do	2.33	3.5
10	do	2.66	65	21	do	2.31	3.3
13	do	2.62	55	23	do	2.31	3.9
15	do	2.61	54	26	do	2.28	2.9
17	do	2.60	51	28	do	2.26	2.6
20	do	2.59	47	30	F. Carrillio	2.26	2.3
22	do	2.59	44	Sept. 2	do	2.26	2.8
24	F. C. Ebert	2.57	44	4	do	2.27	3.1
27	F. S. Pinkham	2.57	44	6	do	2.26	2.3
29	do	2.58	48	9	do	2.26	3.0
31	do	2.00	41	11	do	2.26	3.4
June 3	do	1.94	30	13	do	2.32	3.3
5	do	1.90	28	16	do	2.32	3.4
7	do	1.88	26	18	do	2.30	3.5
10	do	1.84	24	20	do	2.28	3.2
12	do	2.68	21	23	do	2.28	3.3
14	do	2.66	18	25	do	2.28	3.0
17	do	2.68	21	Oct. 1	F. S. Pinkham	2.42	6.7
19	do	2.64	20	3	do	2.40	6.0
21	do	2.64	18	Nov. 19	do	2.40	98
24	do	2.62	16	21	do	2.66	27
26	do	2.60	13	24		2.80	37
29	do	2.60	12				

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Daily discharge, in second-feet, of Santa Ynez River near Santa Barbara, Calif., for the period Jan. 19 to Nov. 24, 1918.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov
1	.....	1.7	201	310	80	36	12	3.5	2.6	6.5	4.5
2	.....	1.7	190	296	74	33	11	3.0	2.8	6.0	4.5
3	.....	1.8	173	277	72	30	11	2.8	3.0	6.0	4.8
4	.....	1.6	166	257	72	29	11	2.5	3.1	47	5.0
5	.....	1.6	187	234	66	28	10	2.5	2.7	20	6.5
6	.....	1.9	455	223	72	27	9	2.5	2.3	13	7
7	.....	2.7	2,750	208	69	26	8	2.5	2.6	10	6.5
8	.....	2.3	1,300	194	72	25	6.5	2.4	2.8	9	6.5
9	.....	1.8	880	190	66	24	5.5	2.3	3.0	8.5	6.5
10	.....	1.6	1,900	184	66	24	5.5	2.5	3.2	8.5	7
11	.....	1.4	2,010	173	64	22	5.0	2.8	3.4	8	7
12	.....	1.5	2,010	166	61	21	5.0	3.0	3.2	7	6.5
13	.....	1.5	1,300	162	58	19	5.0	3.0	3.0	6.0	6.5
14	.....	1.5	720	156	53	18	4.3	2.9	3.2	5.5	15
15	.....	1.5	515	145	50	17	4.3	2.9	3.4	6.0	11
16	.....	1.5	455	135	53	16	4.3	4.3	3.4	6.0	9
17	.....	3.0	395	132	50	21	4.3	3.5	3.4	6.5	9
18	.....	7	720	129	50	20	4.0	3.5	3.5	6.0	160
19	1.0	7	4,280	122	50	20	4.0	3.5	3.4	6.0	98
20	.9	880	1,790	119	48	19	4.0	3.4	3.2	6.0	34
21	1.0	4,810	1,120	116	45	18	3.9	3.3	3.2	6.0	25
22	1.0	2,750	880	107	45	18	3.9	3.6	3.3	5.5	20
23	1.2	545	720	101	45	15	3.8	3.9	3.3	6.0	19
24	1.2	455	645	98	45	16	3.5	3.6	3.2	6.0	37
25	2.4	575	575	95	45	14	3.6	3.2	3.0	5.5	.....
26	3.0	425	515	95	45	13	3.8	2.9	3.0	5.0	.....
27	2.0	326	485	95	45	14	3.7	2.8	38	5.0	.....
28	1.7	257	425	95	45	13	3.6	2.6	20	5.0	.....
29	1.8	.....	395	92	50	12	3.5	2.4	13	4.8	.....
30	1.8	.....	335	86	45	12	2.2	2.3	8	4.8	.....
31	1.8	.....	325	.....	45	.....	2.9	2.4	.....	4.5	.....

NOTE.—No record Oct. 1 to Jan. 19.

Monthly discharge of Santa Ynez River near Santa Barbara, Calif., for the period Jan. 19 to Nov. 24, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
January 19–31	3.0	0.9	1.60	41.3
February	4,810	1.4	395	21,900
March	4,280	166	930	57,200
April	310	86	160	9,520
May	80	45	56.3	3,460
June	36	12	20.7	1,230
July	12	2.9	5.58	343
August	4.3	2.3	2.98	183
September	38	2.3	5.31	316
October	47	4.5	8.25	507
November 1–24	160	4.5	21.5	1,020
The period	.....	.....	.....	95,700

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SANTA YNEZ RIVER NEAR LOMPOC, CALIF.

LOCATION.—Near east boundary of La Misión Vieja de la Purísima grant, at highway bridge 1½ miles east of Lompoc, Santa Barbara County.

DRAINAGE AREA.—725 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 10, 1906, to January 9, 1907; September 25, 1907, to September 30, 1918, when the station was discontinued. (Discharge not computed for 1909.)

GAGE.—Vertical staff fastened to downstream end of pier at right end of center span of bridge; read by McDonald and Daly. Datum lowered 1.00 foot June 27, 1917.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Sand; shifting. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.1 feet at 7 p. m. February 20 (discharge, from extension of rating curve, about 15,700 second-feet); minimum stage, 1.56 feet October 8–12 (discharge, 18 second-feet).

1906–1918: Maximum stage recorded, 13.0 feet January 25, 1914 (discharge, 41,800 second-feet); on account of changes in channel minimum stage varies greatly from year to year; minimum discharge, 5 second-feet October 13 to 21, 1913.

DIVERSIONS.—Except for a small quantity diverted by the city of Santa Barbara at Gibraltar dam, water is not diverted above the station, but some water is pumped from wells along the banks of the river for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. One fairly well-defined rating curve was used February 20 to March 24. Gage read once a day; low-water readings to hundredths; remainder of readings to half-tenths. Daily discharge ascertained by applying gage height to rating table or by interpolation between discharge measurements. Records fair.

Discharge measurements of Santa Ynez River near Lompoc, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 8	Donald McDonald	1.56	18	June 23	Dennis Daly	0.88	88
Nov. 24	Dennis Daly	1.48	26	30	do	.88	67
Dec. 16	do	1.50	22	July 7	do	.94	87
Jan. 1	do	1.50	24	14	do	.88	69
10	F. C. Ebert	1.50	22	28	do	.76	42
Feb. 3	Dennis Daly	1.50	25	30	F. C. Ebert	.75	30
24	do	2.60	3,160	Aug. 4	Dennis Daly	.76	31
Mar. 24	do	1.80	1,650	11	do	.80	36
31	do	1.70	835	18	do	.88	33
Apr. 8	do	1.60	554	25	do	.88	39
14	do	1.60	383	Sept. 1	do	.88	31
15	do	1.60	392	8	do	.88	40
May 19	do	1.05	186	14	do	.90	47
21	F. C. Ebert	1.03	157	22	do	.90	41
June 3	Dennis Daly	1.09	129	29	do	.88	33
9	do	1.02	99	Nov. 20	do	1.11	160
16	do	.92	104				

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Daily discharge, in second-feet, of Santa Ynez River at Lompoc, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	18	22	24	24	25	1,500	800	.....	135	74	30	31
2	18	22	24	24	25	1,200	765	.....	133	74	31	31
3	18	22	24	24	25	1,200	730	.....	131	74	31	31
4	18	22	24	24	25	1,200	695	.....	132	81	31	31
5	18	22	24	24	25	1,350	660	.....	132	87	31	31
6	18	24	24	22	25	1,420	625	.....	124	74	31	31
7	18	24	24	22	25	4,300	590	.....	124	87	31	31
8	18	24	24	22	25	4,020	554	.....	114	87	34	40
9	18	24	22	22	25	3,350	525	.....	99	74	34	41
10	18	24	22	22	25	2,830	497	.....	99	74	36	42
11	18	24	22	22	25	6,750	468	.....	100	81	36	44
12	18	24	22	22	25	4,500	440	.....	100	74	36	45
13	18	24	22	22	25	4,020	411	.....	102	69	35	46
14	18	24	22	22	25	2,830	383	.....	103	69	35	47
15	18	24	22	22	25	2,520	392	.....	104	68	34	47
16	20	26	22	23	70	2,150	386	.....	104	66	34	46
17	20	26	22	23	70	1,980	380	.....	104	64	33	45
18	20	26	22	23	100	1,980	374	.....	104	62	33	44
19	20	26	22	23	900	11,700	368	186	96	60	34	43
20	20	26	22	23	13,300	3,800	362	172	96	58	34	42
21	20	26	22	23	14,400	2,520	.....	157	96	56	35	41
22	20	26	22	24	6,230	2,240	.....	155	88	54	36	41
23	20	26	22	24	3,580	1,980	.....	153	88	52	37	33
24	20	26	24	24	2,830	1,650	.....	151	85	50	38	33
25	20	26	24	24	2,340	1,530	.....	149	81	48	39	33
26	22	26	24	24	2,150	1,420	.....	147	79	46	38	33
27	22	26	24	24	2,150	1,300	.....	145	76	44	37	33
28	22	26	24	25	1,800	1,180	.....	143	73	42	36	33
29	22	26	24	25	.....	1,070	.....	141	70	36	34	33
30	22	26	24	25	.....	950	.....	139	67	30	33	33
31	22	.....	24	25	.....	835	.....	137	.....	30	32	.....

NOTE.—No gage-height record Nov. 4–23; discharge interpolated; Apr. 21–30, discharge estimated as 330 second-feet; May 1–18, discharge estimated as 240 second-feet.

Monthly discharge of Santa Ynez River at Lompoc, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	22	18	19.4	1,190
November	26	22	24.7	1,470
December	24	22	23.0	1,410
January	25	22	23.3	1,430
February	14,400	25	1,800	100,000
March	11,700	835	2,620	161,000
April	800	.....	457	27,200
May	.....	137	203	12,500
June	135	67	101	6,010
July	87	30	62.7	3,860
August	39	30	34.2	2,100
September	47	31	37.8	2,250
The year	14,400	18	443	320,000

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SALINAS RIVER BASIN.

ARROYO SECO NEAR SOLEDAD, CALIF

LOCATION.—In sec. 21, T. 19 S., R. 6 E., at Pettitt's ranch, 15 miles south of Soledad, Monterey County.

DRAINAGE AREA.—215 square miles.

RECORDS AVAILABLE.—January 1, 1901, to September 30, 1918.

GAGE.—Staff in two sections on right bank; lower section fastened to an alder tree 400 feet above cable, upper section fastened to sycamore about 100 feet downstream. The lower section was washed out February 5, 1915. It was replaced in two sections at same location and datum as previous section. Gage read by Mrs. Charles Pettitt.

DISCHARGE MEASUREMENTS.—Made from cable 400 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and solid rock; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.4 feet at 8 a. m. March 12 (discharge, 6,200 second-feet); minimum stage recorded, 1.9 feet September 8–11 (discharge, 0.4 second-foot).

1901–1918: Maximum stage recorded, 16.5 feet at 4.30 p. m. February 21, 1917 (discharge, from extension of rating curve, about 22,000 second-feet); stage 20.5 feet January 25, 1914, gave discharge, 17,500 second-feet. Stream dry during periods in 1902, 1903, 1904, 1906, 1913, and 1914.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation for low water changed during flood of March 12. Rating curves for year fairly well defined below 10,000 second-feet. Gage read to hundredths once a day; more frequently during floods. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of Arroyo Seco near Soledad, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Pettitt.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Feb. 17	2.46	36
24	5.43	1,100
July 26	2.00	1.6

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Daily discharge, in second-feet, of Arroyo Seco near Soledad, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.5	9	17	27	25	209	164	69	38	1.6	1.1	.6
2	6.5	9	20	27	25	209	159	66	36	1.6	1.1	.6
3	6.5	9	20	27	25	202	155	66	33	1.6	1.1	.6
4	7	10	20	27	25	190	146	66	31	1.6	1.1	.6
5	7	10	20	27	25	168	142	66	31	1.6	1.1	.6
6	7	11	20	27	25	146	137	63	29	1.6	1.1	.6
7	7	11	20	25	70	1,300	133	63	29	1.6	1.1	.6
8	7	11	20	25	62	535	133	63	27	1.6	.9	.4
9	7	11	20	25	43	380	128	63	25	1.6	.9	.4
10	7	18	20	25	40	290	128	63	25	1.6	.9	.4
11	.8	24	20	25	31	785	124	63	24	1.6	.9	.4
12	8	22	20	25	29	6,200	124	63	24	2.5	.9	31
13	8	20	22	27	27	4,090	120	60	22	2.5	.9	111
14	9	18	22	33	27	1,640	124	60	22	2.5	.9	100
15	9	17	22	31	25	580	124	57	20	2.5	.9	51
16	9	17	24	31	25	470	120	57	20	2.5	.9	31
17	10	15	24	31	33	348	116	54	18	2.5	.9	29
18	10	15	24	31	107	318	111	54	18	2.5	.9	29
19	10	14	24	31	75	895	103	54	18	2.5	.9	29
20	10	14	24	29	172	490	100	51	17	2.5	.9	29
21	9	14	24	29	785	380	91	51	17	1.6	.6	29
22	9	14	24	27	1,420	364	87	51	15	1.6	.6	27
23	9	14	24	27	1,240	348	84	51	15	1.6	.6	27
24	8	14	24	27	1,300	333	81	51	14	1.6	.6	27
25	8	15	24	27	580	318	78	48	14	1.6	.6	27
26	8	15	24	25	380	238	75	46	1.6	1.6	.6	27
27	8	15	40	25	209	228	75	46	1.6	1.6	.6	25
28	9	15	33	25	209	214	75	43	1.6	1.6	.6	25
29	9	17	29	25	.....	190	72	43	1.6	1.4	.6	25
30	9	17	29	25	.....	177	69	40	1.6	1.4	.6	25
31	9	.....	27	25	.....	168	.....	38	.....	1.4	.6	.....

Monthly discharge of Arroyo Seco near Soledad, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 215 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	10	6.5	8.21	0.038	0.04	505
November	24	9	14.5	.067	.07	863
December	40	17	23.4	.109	.13	1,440
January	33	25	27.2	.127	.15	1,670
February	1,420	25	251	1.17	1.22	13,900
March	6,200	146	722	3.36	3.87	44,400
April	164	69	113	.526	.59	6,720
May	69	38	55.8	.260	.30	3,430
June	38	1.6	19.7	.092	.10	1,170
July	2.5	1.4	1.84	.0086	.01	113
August	1.1	.6	.84	.0039	.004	51.6
September	111	.4	23.7	.110	.12	1,410
The year	6,200	.4	105	.488	6.60	75,700

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COYOTE RIVER BASIN.

COYOTE RIVER NEAR MADRONE, CALIF.

LOCATION.—In northwest corner of San José grant, above highway bridge at mouth of canyon, one-fourth mile below mouth of Las Animas Creek and 2¾ miles northeast of Madrone, Santa Clara County.

DRAINAGE AREA.—193 square miles (reported by Duryea, Haehl, and Gilman).

RECORDS AVAILABLE.—October, 1902, to September 30, 1912; December 8, 1916, to September 30, 1918.

GAGE.—Inclined staff in three sections on left bank about 1,000 feet above highway bridge. Gage for 1902-1912 was on right bank at highway bridge. Read by Mrs. A. Rosa.

DISCHARGE MEASUREMENTS.—Made from highway bridge below gage or by wading.

CHANNEL AND CONTROL.—Bed consists of gravel, boulders, and solid rock. Banks high; one channel at all stages. Control boulders and solid rock; permanent. Zero flow, gage height 1.6 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.5 feet at 4 p. m. March 12 (discharge, 2,090 second-feet); minimum stage unknown; incomplete record.

1902-1912 and 1917-1918: Maximum discharge recorded, probably March 7, 1911 (discharge, 25,000 second-feet); minimum discharge not known, as record is incomplete.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined throughout. Gage read once daily, usually to tenths. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Coyote River near Madrone, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 17	J. F. Kunesh	2.06	1.0	May 2	H. D. McGlashan	2.51	5.9
Dec. 5	Charles Leidl	2.09	1.6	23	do	2.37	4.0
5	do	2.09	1.6	June 27	do	2.08	1.1
Mar. 13	do	5.90	481				

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Daily discharge, in second-feet, of Coyote River near Madrone, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	0.4	0.4	0.8	0.8	1.6	21	21	5	2.5	1.2	.....
2	.4	.4	.8	.8	1.6	18	18	6	2.5	1.2	.....
3	.4	.4	.8	.8	1.6	14	18	3.7	2.5	.8	.....
4	.4	.8	.8	.8	1.6	14	14	3.7	2.5	.8	.....
5	.4	.8	1.6	.8	1.6	11	14	3.7	2.5	.8	0.1
6	.4	.8	1.6	.8	2.5	14	14	3.7	2.5	.8	.....
7	.4	.8	1.6	.8	3.7	21	14	3.7	2.5	.8	.....
8	.4	.8	1.6	.8	2.5	62	14	5	2.5	.8	.....
9	.4	.8	.8	1.6	2.5	54	14	5	2.5	.4	.....
10	.4	.8	.8	1.6	2.5	70	11	3.7	2.5	.6	.....
11	.8	.4	1.6	2.5	2.5	62	11	3.7	2.5	.6	.....
12	.8	.4	1.6	2.5	2.5	2,090	11	3.7	2.5	.4	.....
13	.8	.8	1.6	2.5	2.5	530	11	3.7	2.5	.4	.....
14	.4	.8	1.6	2.5	2.5	238	11	3.7	1.6	.2	.....
15	.4	.8	1.6	2.5	2.5	149	11	3.7	1.6	.2	.....
16	.4	.8	1.6	2.5	5	90	9	3.7	1.6	.2	.....
17	.4	1.0	1.6	2.5	5	36	9	3.7	1.6	.1	.....
18	.4	.8	1.6	2.5	3.7	36	9	3.7	1.6	.1	.....
19	.4	.8	1.6	2.5	3.7	770	7	2.5	1.6	.1	.....
20	.4	.8	1.6	2.5	3.7	238	7	2.5	1.6	.1	.....
21	.2	.8	1.6	2.5	7	217	7	2.5	1.6	.....	.....
22	.2	.8	1.6	2.5	48	123	7	2.5	1.6	.....	.....
23	.2	.8	1.6	2.5	36	80	5	3.5	1.4	.....	.....
24	.2	.8	1.6	2.5	41	41	5	2.5	1.4	.....	.....
25	.2	.8	1.6	2.5	41	41	5	2.5	1.2	.....	.....
26	.2	.8	1.6	2.5	36	36	5	3.1	1.2	.....	.....
27	.2	.8	1.6	2.5	36	30	3.7	3.1	1.3	.....	.....
28	.4	.8	1.6	2.5	26	26	3.7	2.5	1.2	.....	.....
29	.4	.8	1.6	2.5	.....	21	3.7	2.5	1.2	.....	.....
30	.4	.8	1.6	1.6	.....	21	5	2.5	1.2	.....	.....
31	.4	.....	1.6	1.6	.....	21	.....	2.5	.....	.....	.....

NOTE.—No gage-height record July 21 to Sept. 30; discharge July 21-31 estimated as 0.1 second-foot. No estimates for August or September, on account of storms Sept. 11-12 and 29-30.

Monthly discharge of Coyote River near Madrone, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0.8	0.2	0.39	24.0
November	1.0	.4	.74	44.0
December	1.6	.8	1.45	89.2
January	2.5	.8	1.95	120
February	48	1.6	11.7	650
March	2,090	11	168	10,300
April	21	3.7	9.94	591
May	6	2.5	3.47	213
June	2.5	1.2	1.90	113
July	1.2	.0	.38	23.4
August	.....	.....	.1	6.1
The period	.....	.....	.....	12,200

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COYOTE RIVER AT COYOTE, CALIF.

LOCATION.—Near north end of La Laguna Seca grant, one-fourth mile above ford and just east of Coyote, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Vertical staff in two sections, fastened to sycamore trees on left bank, 1,000 feet east of post office at Coyote; read by Nancy Boland.

DISCHARGE MEASUREMENTS.—Made from cable 40 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel; shifting during high water. Channel clean and straight for several hundred feet above and below gage. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.5 feet at 5 p. m. March 12 (discharge, 1,470 second-feet); stream dry October 1 to March 11 and March 25 to September 30.

1917–1918: Maximum stage recorded, 15.2 feet at 5.30 p. m. February 2, 1917 (discharge, 9,900 second-feet); no flow most of each year.

DIVERSIONS.—None. Some water is pumped from wells along the river above Coyote.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed in 1918. Rating curve well defined. Gage read to tenths twice daily; more frequently during high water. Daily discharge ascertained by applying mean daily gage heights to rating table; except March 12, 13, 19, and 24, for which it was computed from plotted hydrographs. Records good.

Discharge measurements of Coyote Creek at Coyote, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 13	8.28	408	Mar. 20	8.02	305
19	8.75	572	23	6.60	12

Daily discharge, in second-feet, of Coyote River at Coyote, Calif., for the year ending Sept. 30, 1918.

Day.	Mar.	Day.	Mar.	Day.	Mar.
12	809	16	3.0	22	36
13	468	19	288	23	8
14	100	20	257	24	1.2
15	25	21	90		

NOTE—No flow Oct. 1 to Mar. 11, Mar. 17–18, and Mar. 25 to Sept. 30. Mean discharge for March, 67.3 second feet; mean for year, 5.71 second-feet; total discharge for year, 4,140 acre-feet.

COYOTE RIVER NEAR EDENVALE, CALIF.

LOCATION.—At east boundary of Santa Teresa grant at "The Narrows," 1½ miles northeast of Edenvale, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Inclined staff in two sections fastened to solid rock on left bank at "The Narrows"; read by Mrs. J. H. Swickard.

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DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above gage or by wading.

CHANNEL AND CONTROL.—Fine gravel overlying solid rock; not permanent. Channel is clean and straight for several hundred feet above and below gage. Left bank, high; right bank not likely to be overflowed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.6 feet at 5 p. m. March 12 (discharge, 915 second-feet); stream dry October 1 to March 11, March 17, 18, and March 24 to September 30.

1917–1918: Maximum stage recorded, 12.2 feet at 6.10 p. m. February 21, 1917 (discharge, 8,590 second-feet); no flow during most of each year.

DIVERSIONS.—None. Water is pumped from wells along the river above station for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to half-tenths twice daily; more frequently during high water. Daily discharge ascertained by applying mean daily gage heights to rating table, except March 12, 16, 19, and 24, for which it was computed from plotted hydrographs. Records good.

Discharge measurements of Coyote River near Edenvale Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Mar. 13	4.55	335
20	4.32	248
23	2.98	0.2

Daily discharge, in second-feet, of Coyote River near Edenvale, Calif., for the year ending Sept. 30, 1918.

Day.	Mar.	Day.	Mar.	Day.	Mar.
12	363	16	1	22	12
13	405	19	159	23	1.3
14	74	20	240		
15	6.5	21	60		

NOTE.—No flow Oct. 1 to Mar. 11, Mar. 17, 18, and Mar. 24 to Sept. 30. Mean discharge for March, 42.6 second-feet; mean for year, 3.62 second-feet; total discharge for year, 2,620 second-feet.

LAGUNA SECA NEAR COYOTE, CALIF.

LOCATION.—In La Laguna Seca grant, at highway bridge on Bailey Avenue, 1¼ miles south of Coyote, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 17 to June 30, 1918, when station was discontinued.

GAGE.—Vertical staff in two sections fastened to downstream side of bridge near right bank. Gage read by E. W. Pruett.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 100 feet below gage.

CHANNEL AND CONTROL.—Drainage canal in clay and hardpan. Banks clean and high. Channel straight below bridge for one-fourth mile and curving above bridge. Control affected by growth of weeds.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.48 feet April 12 and 14 (discharge, 1.3 second-feet); no flow after June 27.

DIVERSIONS.—None.

REGULATION.—None.

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ACCURACY.—Stage-discharge relation changed June 17 when a small dam was built across the creek below the gage. Rating curve before change well defined; after change not defined. Gage read to hundredths about every other day. Daily discharge ascertained by applying gage height to rating curve and interpolating discharge for days on which gage height was not read, except June 17 to 27, when discharge was interpolated. Records good.

Discharge measurements of Laguna Seca near Coyote, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 6	Charles Leidl	0.41	0.4	Mar. 23	Charles Leidl	0.86	0.5
Jan. 17	do	.29	.02	May 2	McGlashan and Bailey	1.38	1.2
Mar. 13	do	.52	.15	23	H. D. McGlashan	1.27	.9
19	do	.73	.3	June 27	do	.93	.0

Daily discharge, in second-feet, of Laguna Seca near Coyote, Calif., for the year ending Sept. 30, 1918.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	0.07	0.07	1.0	1.2	0.9	16	.....	0.07	0.14	1.3	1.1	0.3
2	.....	.07	.07	1.1	1.2	.8	17	0.01	.08	.14	1.3	1.0	.3
3	.....	.07	.07	1.2	1.2	.8	18	.02	.07	.2	1.3	1.0	.3
4	.....	.07	.07	1.2	1.2	.8	19	.02	.09	.3	1.2	1.0	.2
5	.....	.07	.07	1.2	1.2	.8	20	.03	.08	.3	1.2	1.0	.2
6	.....	.08	.08	1.3	1.1	.8	21	.03	.08	.3	1.2	1.0	.2
7	.....	.08	.08	1.3	1.1	.7	22	.03	.08	.4	1.2	1.0	.1
8	.....	.08	.08	1.3	1.1	.6	23	.03	.14	.5	1.2	1.0	.1
9	.....	.07	.08	1.3	1.1	.6	24	.03	.08	.5	1.2	1.0	.1
10	.....	.07	.14	1.3	1.1	.6	25	.05	.07	.6	1.2	1.0	.06
11	.....	.07	.11	1.3	1.1	.5	26	.07	.07	.7	1.2	1.0	.03
12	.....	.06	.20	1.3	1.1	.4	27	.06	.07	.8	1.2	1.0	.00
13	.....	.06	.14	1.3	1.1	.4	28	.06	.07	.8	1.2	1.0	.00
14	.....	.06	.14	1.3	1.1	.4	29	.06	.....	.8	1.2	1.0	.00
15	.....	.06	.13	1.3	1.1	.3	30	.07	.....	1.0	1.2	.9	.00
							31	.07	.....	1.0	.....	.9	.....

Monthly discharge of Laguna Seca near Coyote, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
January 17-31	0.07	0.01	0.046	1.3
February	.14	.06	.075	4.2
March	1.0	.07	.326	20.0
April	1.3	1.0	1.23	73.2
May	1.2	.9	1.06	65.2
June	.9	.00	.376	22.4
The period	.....	.....	.....	186

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LAGUNA SECA AT COYOTE, CALIF.

LOCATION.—In La Laguna Seca grant, at highway crossing just above junction with Coyote River, half a mile northwest of Coyote, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 20, 1916, to August 14, 1918 (discharge measurements only).

DISCHARGE MEASUREMENTS.—Made by wading at or near highway culvert, 200 feet above mouth.

DIVERSIONS.—None.

REGULATION.—None.

Discharge measurements of Laguna Seca at Coyote, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 5	Charles Leidl		1.7	May 23	H. D. McGlashan		2.6
Mar. 23	do		3.9	June 27	do		.9
May 2	H. D. McGlashan		4.0	Aug. 5	do		.2

ALAMEDA CREEK BASIN.

ALAMEDA CREEK AT SUNOLGLEN, CALIF.

LOCATION.—In SE. ¼ sec. 7, T. 4 S., R. 1 E., at Sunol dam, 1 mile below junction with Arroyo de la Laguna and 1 mile west of Sunolglen, Alameda County.

DRAINAGE AREA.—620 square miles (measured by Spring Valley Water Co.).

RECORDS AVAILABLE.—October 4, 1900, to September 30, 1918.

GAGE.—Gurley printing water-stage recorder on upstream face of dam on left bank. Previous to 1914 a staff gage on upstream side of dam on right bank was used.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge about 400 feet above dam. Heavy weights and stay line are used for high-water measurements to insure correct position of current meter.

CHANNEL AND CONTROL.—The concrete dam acts as a control for the station. Bed above and below dam consists of gravel and boulders; shifts during high water.

EXTREMES OF DISCHARGE.—1901–1918: Maximum mean daily discharge, 14,700 second-feet March 7, 1911; minimum, no flow for part of nearly every year.

DIVERSIONS.—See Spring Valley Water Co.'s aqueduct near Sunolglen, page 98.

REGULATION.—None.

ACCURACY.—The dam has been rated in accordance with the cooperative agreement between the Spring Valley Water Co. and the city of San Francisco. Current-meter measurements have been obtained by both parties and a rating curve developed which has been accepted by both.

COOPERATION.—Records showing million gallons per day furnished by Spring Valley Water Co. through F. C. Herrmann, chief engineer, and G. A. Elliott, engineer. Daily discharge converted into second-feet and monthly discharge computed by engineers of United States Geological Survey.

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Daily discharge, in second-feet, of Alameda Creek at Sunolglen, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	July.	Aug.	Sept.
1	61	20	0.9	.....	0.7	6	.....	29	19
2	61	13	.9	.....	.6	6	.....	29	19
3	57	12	.9	.....	.6	4.5	.....	29	19
4	53	10	.9	0.1	.5	4.0	.....	29	19
5	57	9	.8	.1	.2	4.5	.....	28	19
6	57	10	.8	.4	.4	1.5	.....	28	19
7	61	9	.8	.4	.5	.8	.....	27	19
8	66	9	.8	.6	.6	1.7	.....	27	19
9	66	8	.8	.4	.6	.6	.....	27	19
10	66	8	.8	.4	2.2	.5	.....	27	19
11	66	7.5	.6	.4	119	.5	.....	27	19
12	69	6.5	.6	.4	562	.5	.....	11	74
13	69	9	.6	.4	362	.4	12	11	101
14	69	4.6	.6	.4	176	.3	14	26	127
15	69	3.2	.6	.4	50	.2	17	26	155
16	69	3.1	.5	.4	22	.2	22	25	74
17	73	3.1	.5	.6	11	.2	28	25	53
18	66	2.3	.5	.1	13	.1	36	24	51
19	104	2.0	.5	.2	570	.1	34	23	50
20	91	1.4	.5	.1	326	.1	32	23	48
21	73	1.4	.3	73	147	.1	32	22	46
22	66	1.4	.3	33	70	.....	31	22	45
23	61	1.4	.3	12	35	.....	30	22	42
24	73	1.4	.3	64	28	.....	29	21	40
25	73	1.2	.3	19	19	.....	29	21	38
26	69	1.1	.3	5.5	11	.....	29	21	36
27	66	1.1	.3	1.3	9	.....	29	20	34
28	66	.9	.....	1.0	9	.....	29	20	32
29	61	.9	.....	.....	8.5	.....	29	20	31
30	79	.9	.....	.....	7	.....	29	20	7.5
31	73	.....	.....	.....	7	.....	29	20	.....

NOTE.—Creek dry Dec. 28 to Feb. 3 and Apr. 22 to July 12. Flow during summer due to release of water from Calaveras reservoir.

Monthly discharge of Alameda Creek at Sunolglen, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	104	53	68.1	4,190
November	20	.9	5.41	322
December	.9	.0	.52	32.0
February	73	.0	7.66	425
March	570	.2	82.9	5,100
April	6	.0	1.09	64.9
July	34	.0	16.8	1,030
August	29	11	23.5	1,440
September	155	7.5	43.1	2,560
The year	570	.0	21.0	15,200

ALAMEDA CREEK NEAR NILES, CALIF.

LOCATION.—In Niles Canyon, one-eighth mile below first Southern Pacific Co. bridge above Niles, one-fourth mile above highway bridge, and 1¼ miles northeast of Niles, Alameda County.

DRAINAGE AREA.—633 square miles (measured on topographic map by State Water Commission).

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

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GAGE.—Gurley electric printing water-stage recorder on right bank at highway water tank 1,800 feet above highway bridge. Previous to January 15, gage was a Spring Valley Water Co. type water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge 800 feet below gage, or by wading.

CHANNEL AND CONTROL.—Gravel; not permanent. Banks are high; channel straight from gage to some distance below suspension bridge. Control at gage solid rock and boulders.

DIVERSIONS.—Spring Valley Water Co. obtains water from the gravels at lower end of Livermore Valley, above station. (See Spring Valley Water Co's aqueduct near Sunolglen.) Water for irrigation is diverted on right bank at Niles dam, about 1 mile above station.

REGULATION.—Spring Valley Water Co. has under construction a large storage reservoir on Calaveras Creek From Calaveras reservoir water was released October 1 to about November 2, and July 15 to September 30.

ACCURACY.—Stage-discharge relation not permanent. Frequent discharge measurements covering entire range of stage, were obtained. Rating curves are well defined. Daily discharge determined by averaging the results obtained by applying mean gage height for short period to rating table. Special care was exercised in making discharge measurements, maintaining water-stage recorder and other equipment and compiling record. Records excellent for this type of station.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

Discharge measurements of Alameda Creek, near Niles, Calif., during the period Aug. 3, 1917, to Sept. 30, 1918.

[Made by State Water Commission.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1917.	*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Aug. 3	1.21	33	Mar. 11	1.75	106	Mar. 20	2.54	389
Sept. 7	1.21	34	11	1.71	102	20	2.40	310
Oct. 22	1.41	56	12	2.10	196	21	1.95	182
			12	3.23	762	22	1.62	88
1918.			12	3.78	1,170	23	1.34	47
Jan. 2	.33	0.2	12	3.71	1,050	28	.86	9.7
Feb. 21	1.77	107	12	3.19	744	July 25	.99	16
21	1.56	67	13	2.40	326	30	1.06	20
21	1.49	62	13	2.44	336	Aug. 30	1.04	17
22	1.11	21	14	1.90	162	Sept. 13	1.88	134
22	1.09	22	14	1.78	117	13	1.86	136
23	1.04	18	15	1.40	53	14	2.50	299
26	.86	9.8	16	1.21	34	14	2.09	180
26	.83	8.2	18	.95	14	15	1.50	66
27	.59	3.0	19	3.17	826	16	1.30	40
27	.57	2.2	19	3.87	1,210	17	1.26	40
Mar. 4	.47	1.2	19	3.30	798	28	.88	8.4
11	1.83	119	19	3.17	755			

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Daily discharge, in second-feet, of Alameda Creek near Niles, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	58.5	22.5	1.0	0.0	0.2	1.5	3.5	0.2	0.1	.....	26.5	8.5
2	53	11.5	1.0	.1	.2	1.5	.5	.2	.1	.....	19.5	5.0
3	49	7.5	1.0	.2	.2	1.0	.5	.1	.1	.....	22	5.0
4	49	5.5	1.0	.2	.2	1.0	.5	.1	.1	.....	21	2.5
5	50.5	5.0	1.0	.2	.3	1.0	.5	.1	.1	.....	22.5	4.0
6	49	5.5	1.0	.2	.5	1.0	.5	.1	.1	.....	22	4.0
7	53	6.0	.5	.1	.5	2.0	.5	.1	.1	.....	22	10
8	53	5.0	.3	.1	.5	2.0	.4	.1	.1	.....	23	10
9	51.5	4.5	.2	.1	.5	1.5	.5	.1	.1	.....	21	9.0
10	51.5	3.5	.4	.0	.4	2.5	.5	.1	.1	.....	16.5	7.5
11	53	3.0	.5	.2	.4	103	.4	.2	.1	.....	18.5	10
12	54	3.0	.5	.2	.4	575	.4	.2	.1	.....	12.5	31.5
13	55	1.5	1.0	.3	.5	376	.4	.2	.....	.....	9.5	95.5
14	58.5	1.5	1.5	.4	.5	151	.3	.1	.....	.....	19	187
15	55	1.5	.5	.4	.5	63	.3	.1	.....	4.5	11.5	68
16	56.5	1.5	.5	.4	.5	33	.3	.1	.....	9.5	19	43.5
17	58.5	1.0	.5	.4	1.0	17	.3	.1	.....	2.0	22	36.5
18	51.5	1.0	.5	.4	.5	16.5	.2	.1	.....	.1	19	36
19	85.5	1.0	.5	.3	1.0	571	.2	.1	.....	.5	21.5	33
20	78.5	1.0	.4	.2	.5	335	.2	.1	.....	6.5	22	34
21	61	1.0	.3	.2	41.0	161	.2	.1	.....	10.5	22	29
22	55	1.0	.2	.2	30.5	85	.2	.1	.....	12	22	23.5
23	53	.5	.2	.2	18.0	50	.2	.1	.....	12.5	16.5	28.5
24	66.5	.5	.2	.2	37.5	33	.2	.1	.....	14	16.5	39.5
25	64	.5	.2	.2	28.0	23	.2	.1	.....	14.5	20	26
26	58.5	.5	.2	.2	8.0	17	.2	.1	.....	16.5	16.5	10
27	55	.5	.2	.2	3.0	13	.2	.1	.....	16.5	9.5	8.0
28	54	1.0	.2	.2	2.0	9.0	.2	.1	.....	17.5	15.5	7.0
29	54	1.5	.0	.2	.....	7.0	.2	.1	.....	19.5	18	7.5
30	61	1.0	.0	.2	.....	6.0	.2	.1	.....	18.5	18	8.5
31	62.5	.....	.0	.2	.....	6.0	.....	.1	.....	20.5	18	.....

NOTE.—No flow June 13 to July 14.

Monthly discharge of Alameda Creek near Niles, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
October	85.5	49	57	3,500
November	22.5	.5	3.35	199
December	1.5	.0	.50	30.7
January	.4	.0	.21	12.9
February	41	.2	6.33	352
March	575	1.0	86.0	5,290
April	3.5	.2	.43	25.6
May	.2	.1	.12	7.4
June	.1	.0	.04	2.4
July	20.5	.0	6.31	388
August	26.5	9.5	18.8	1,160
September	187	2.5	27.6	1,640
The year	575	.0	17.4	12,600

ALAMEDA CREEK NEAR DECOTO, CALIF.

LOCATION.—At Beard tract, 400 feet above mouth of Dry Creek, below Crandall Slough, 1 mile southwest of Decoto, Alameda County, and about 6¾ miles below station in Niles Canyon near Niles.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Gurley electric printing water-stage recorder on left bank, 400 feet above mouth of Dry Creek. Previous to January 15 gage was a Spring Valley Water Co. type water-stage recorder.

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DISCHARGE MEASUREMENTS.—Made from suspension foot bridge just above gage, or by wading. Measurements are also made at Rodriques bridge, 1¼ miles downstream, and results reduced by discharge of Dry Creek to give flow at gage.

CHANNEL AND CONTROL.—Gravel, sand, and silt; not permanent. Banks are high and steep, and have been cleared in vicinity of station. At flood stage some water leaves channel through Crandall Slough, 1½ miles above gage.

DIVERSIONS.—See Alameda Creek near Niles. In addition, water is pumped from creek at four points above station for irrigation purposes. Some water is returned to creek at three gravel-washing plants between mouth of canyon and station.

REGULATION.—See Alameda Creek near Niles.

ACCURACY.—Stage-discharge relation not permanent. Frequent discharge measurements were obtained covering entire range of stage. Several well-defined rating curves were used during year. Daily discharge determined by applying mean gage height for fractional parts of a day to rating table. Special care was exercised in making discharge measurements, maintaining water-stage recorder and other equipment, and compiling record. Results excellent for this type of station.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

Discharge measurements of Alameda Creek near Decoto, Calif., during the period Aug. 3, 1917, to Sept. 30, 1918.

[Made by State water commission.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1917.	*Feet.*	*Sec.-ft.*	1918.	*Feet.*	*Sec.-ft.*	1918.	*Feet.*	*Sec.-ft.*
Aug. 3	4.07	10	Mar. 15	5.45	67	Mar. 21	7.17	173
Oct. 23	4.83	40	15	5.35	63	21	7.02	164
1918.			16	4.60	26	22	5.95	82
Mar. 12	7.93	244	17	4.14	12	23	5.07	43
12	11.02	863	18	3.59	2.4	28	3.46	0.6
12	10.49	687	19	11.07	928	Sept. 14	7.09	145
13	8.71	337	19	10.65	760	15	5.56	50
13	8.63	336	20	8.75	380	15	5.23	43
14	6.90	146	20	8.82	382	16	4.45	17
14	6.68	130	20	8.78	358	16	4.35	14
14	6.52	130	21	7.07	160	17	4.10	8.3
15	5.47	64	21	6.97	161	20	3.98	5.7
			21	7.23	178			

Daily discharge in second-feet, of Alameda Creek near Decoto, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Mar.	Sept.	Day.	Oct.	Nov.	Mar.	Sept.
1	29.5	32.5	.....	.....	16	41	.....	25.5	16.5
2	28.5	8.5	.....	.....	17	40	.....	9.0	9.0
3	29	1.5	.....	.....	18	38.5	.....	2.0	6.5
4	26	.....	.....	.....	19	39.5	.....	416	5.5
5	26.5	.....	.....	.....	20	84	.....	368	5.
6	29	.....	.....	.....	21	55	.....	176	6.
7	31.5	.....	.....	.....	22	42	.....	82.5	2.0
8	34.5	.....	.....	.....	23	38.5	.....	43.0	.3
9	35	.....	.....	.....	24	45.5	.....	26.0	2.5
10	36	.....	.....	.....	25	52.5	.....	6.5	3.5
11	38	.....	.....	.....	26	49.5	.....	.5	1.5
12	39	.....	322	.....	27	45.5	.....	.5	.....
13	41	.....	420	.....	28	43	.....	.....	.....
14	41	.....	161	103	29	39	.....	.....	.....
15	41	.....	63.5	47	30	44	.....	.....	.....
					31	53.5	.....	.....	.....

NOTE.—No flow on days for which no discharge is given.

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Monthly discharge of Alameda Creek near Decoto, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
October	84	26	40.5	2,490
November	32.5	0	1.42	84.5
March	420	0	68.4	4,210
September	103	0	6.96	414
The year	420	0	9.94	7,200

SPRING VALLEY WATER CO.'S AQUEDUCT NEAR SUNOLGLEN, CALIF.

LOCATION.—In sec. 12, T. 4 S., R. 1 W., at Brightwide weirs, 2½ miles west of Sunolglen, Alameda County.

RECORDS AVAILABLE.—April 6, 1903, to September 30, 1918.

GAGE.—Spring Valley water-stage recorder in pool above the weirs.

DISCHARGE.—Computed from gage-height record showing head over four rectangular bronze weirs, each having a 30-inch crest.

EXTREMES OF DISCHARGE.—1903–1918: Maximum mean daily discharge reported, 47 second-feet March 21, 1914.

ACCURACY.—The weirs were very carefully installed and much care is exercised in their maintenance. There is no velocity of approach.

COOPERATION.—Records showing thousand gallons per day furnished by Spring Valley Water Co. through F. C. Herrmann, chief engineer, and G. A. Elliott, engineer. Daily discharge converted into second-feet and monthly discharge computed by engineers of United States Geological Survey.

Daily discharge, in second-feet, of Spring Valley Water Co.'s Aqueduct near Sunolglen, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	34	34	26	23	23	34	32	33	28	25	34	30
2	34	34	25	23	16.1	34	32	33	29	23	25	31
3	34	34	25	23	15.6	33	32	33	29	22	34	30
4	34	34	25	23	25	33	32	33	28	23	34	29
5	34	33	25	23	23	33	32	34	28	24	33	28
6	34	33	25	23	22	32	32	34	28	23	34	29
7	34	32	25	23	23	32	33	34	27	22	34	29
8	35	32	25	23	25	32	32	33	27	23	34	29
9	34	31	23	23	28	31	33	34	27	23	33	29
10	34	31	25	23	29	32	32	33	28	23	31	29
11	34	30	25	23	24	33	32	34	27	24	32	28
12	34	30	26	23	23	32	32	33	26	28	34	25
13	34	30	26	23	28	33	32	34	26	33	34	24
14	34	30	26	23	28	33	32	33	26	35	34	28
15	34	30	25	23	29	32	32	32	25	35	34	29
16	33	30	25	23	29	32	32	32	24	35	33	29
17	34	29	23	23	27	32	32	32	25	34	34	28
18	34	28	26	23	26	32	32	31	24	31	34	28
19	35	29	24	22	28	32	32	31	25	29	32	28
20	36	28	25	22	29	33	31	32	25	33	34	25
21	35	28	25	23	26	34	32	31	24	34	32	24
22	34	28	24	23	30	32	33	31	20	34	33	23
23	34	27	24	23	33	33	32	30	24	34	33	33
24	34	27	24	23	32	32	32	30	25	34	33	33
25	34	27	24	23	35	32	32	30	25	34	32	30
26	34	26	24	22	34	32	32	30	24	34	33	33
27	34	26	24	22	34	32	34	30	24	34	31	33
28	34	26	24	12.6	33	32	33	29	24	34	30	33
29	34	26	24	17.8	.....	32	34	26	23	33	28	33
30	34	26	23	23	.....	32	33	28	19.0	25	30	34
31	34	.....	23	23	.....	32	.....	28	.....	34	30	.....

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Monthly discharge of Spring Valley Water Co.'s Aqueduct near Sunolglen, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	36	33	34.1	2,100
November	34	26	29.6	1,760
December	26	23	24.6	1,510
January	23	12.6	22.4	1,380
February	35	15.6	27.1	1,510
March	34	31	32.4	1,990
April	34	31	32.3	1,920
May	34	26	31.6	1,940
June	29	19.0	25.5	1,520
July	35	22	29.4	1,810
August	34	25	32.5	2,000
September	34	23	29.1	1,730
The year	36	12.6	29.2	21,200

CRANDALL SLOUGH NEAR CENTERVILLE, CALIF.

LOCATION.—Just below crossing of Centerville-Alvarado highway, 1½ miles northwest of Centerville, Alameda County.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Stevens water-stage recorder (8-day type) about 300 feet below highway crossing. Stream in one channel at this point.

DISCHARGE MEASUREMENTS.—Left channel—made from cable one-fourth mile below gage; right channel—made from footbridge 500 feet below gage.

CHANNEL AND CONTROL.—Grazing land.

EXTREMES OF DISCHARGE.—Creek dry all year.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

No discharge measurements were made, as there was no flow during the year.

LAGUNA CREEK AT IRVINGTON, CALIF.

LOCATION.—At outlet of lagoon, one-fourth mile north of Irvington, Alameda County.

DRAINAGE AREA.—10.8 square miles (measured on topographic map by State Water Commission).

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Vertical staff on left bank just below outlet of lagoon; read by A. Peixotto.

DISCHARGE MEASUREMENTS.—Made by floats near gage.

CHANNEL AND CONTROL.—Bed overgrown with tule; current very sluggish.

DIVERSIONS.—Water is diverted from Mission and Rose creeks for irrigation purposes.

REGULATION.—Natural storage in lagoon.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

The following discharge measurement was made by engineers of State Water Commission:

March 14, 1918: Gage height, 1.35 feet; discharge, 0.50 second-feet.

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Daily discharge, in second-feet, of Laguna Creek at Irvington, Calif., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May.	Day.	Feb.	Mar.	Apr.	May.
1	.....	2	7	2	16	.....	4	4	.....
2	.....	2	7	1	17	.....	4	4	.....
3	.....	2	7	1	18	.....	4	4	.....
4	.....	2	6	1	19	.....	9	3	.....
5	.....	2	6	1	20	.....	9	3	.....
6	.....	2	5	.....	21	2	9	3	.....
7	.....	2	5	.....	22	2	9	3	.....
8	.....	2	4	.....	23	2	9	3	.....
9	.....	2	4	.....	24	3	9	3	.....
10	.....	3	4	.....	25	2	8	3	.....
11	.....	3	4	.....	26	2	8	3	.....
12	.....	3	4	.....	27	2	8	3	.....
13	.....	3	4	.....	28	2	8	2	.....
14	.....	4	4	.....	29	.....	8	2	.....
15	.....	4	4	.....	30	.....	8	2	.....
					31	.....	8	.....	.....

NOTE.—No flow Oct. 1 to Feb. 20 and May 6 to Sept. 30.

Monthly discharge of Laguna Creek at Irvington, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
February	0.3	0.0	0.06	3.3
March	.9	.2	.52	32.0
April	.7	.2	.40	23.8
May	.2	.0	.02	1.2
The year	.9	.0	.08	60.3

DRY CREEK NEAR DECOTO, CALIF.

LOCATION.—Just below Niles-Alvarado highway bridge, one-fourth mile above junction with Alameda Creek, and 1 mile southwest of Decoto, Alameda County.

DRAINAGE AREA.—9.4 square miles above floor of valley (measured on topographic map by State Water Commission).

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1918.

GAGE.—Lietz water-stage recorder on right bank 500 feet below highway bridge.

DISCHARGE MEASUREMENTS.—Made from footbridge just above gage or by wading.

CHANNEL AND CONTROL.—Gravel; shifting. Banks high and cleared in vicinity of station.

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

Stream dry all year except as follows: March 19, discharge 22.5 second-feet; March 20, discharge 8 second-feet.

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Discharge measurements of Dry Creek near Decoto, Calif., during the year ending Sept. 30, 1918.

[Made by State Water Commission.]

Date	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Mar. 19	2.00	24
19	1.75	15
20	1.40	2.5

SAN PABLO CREEK BASIN.

SAN PABLO CREEK NEAR SAN PABLO, CALIF.

LOCATION.—In NE. ¼ sec. 11, T. 1 N., R. 4 W., 800 feet below San Pablo dam and 5 miles east of San Pablo, Contra Costa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Vertical staff in two sections 800 feet below the dam; low-water section is fastened to an alder tree on left bank 50 feet below the cable; high-water section fastened to an alder tree on right bank 120 feet above the low-water section. Read by employees of East Bay Water Co.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet above low-water gage or by wading.

CHANNEL AND CONTROL.—Fine gravel; fairly permanent. Banks are steep and covered with brush; will overflow at high stages. Channel is straight for 150 feet above and 150 feet below the cable.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.3 feet for 50 minutes February 21 (discharge, 620 second-feet); no flow October 1 to February 20 and May 19 to September 30.

DIVERSIONS.—None.

REGULATION.—Flow completely regulated by San Pablo dam above station.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Gage read to tenths twice daily; more frequently during storms. Daily discharge ascertained by applying mean daily gage height to the rating curve except February 21, 23, March 11, and 12, when hourly discharge was averaged. Records fair.

Discharge measurements of San Pablo Creek near San Pablo, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 21	Barkley and Green	1.25	10	Mar. 11	Barkley and Green	5.00	405
22	do	.90	1.5	11	do	2.50	131
22	do	5.40	445	12	do	5.50	470
23	do	6.50	590	12	J. W. Barkley	2.30	86
23	do	5.45	417	27	do	1.00	7.0
23	do	3.90	295				

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Daily discharge, in second-feet, of San Pablo Creek near San Pablo, Calif., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Day.	Feb.	Mar.	Day.	Feb.	Mar.
1		a 1	11		87	21	85	5
2		a 1	12		116	22	7	5
3		a 1	13		25	23	160	5
4		a 1	14		a 1	24	a 1	5
5		a 1	15		a 1	25	a 1	5
6		a 1	16		a 1	26	a 1	5
7		a 1	17		a 1	27	a 1	5
8		a 1	18		a 1	28	a 1	2
9		a 1	19		43	29		1
10		13	20		5	30		1
						31		

a Estimated by observer.

NOTE.—No flow Oct. 1 to Feb. 20 and May. 19 to Sept. 30. Discharge estimated Apr. 1-30, 0.2 second-feet; May 1-18, 0.05 second-feet.

Monthly discharge of San Pablo Creek near San Pablo, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February	160	0	9.2	511
March	116	1	11.1	683
April			.2	11.9
May			.03	1.8
The year	160	0	1.7	1,208

SAN PABLO CREEK AT SAN PABLO, CALIF.

LOCATION.—In NE. ¼ sec. 1, T. 1 N., R. 3 W. (unsurveyed), between Southern Pacific and Atchison, Topeka & Santa Fe railway tracks, half a mile north of San Pablo, Contra Costa County, and 2 miles above San Pablo Bay.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Staff gage in two sections on right bank; first section inclined; second section vertical; read by employees of East Bay Water Co.

DISCHARGE MEASUREMENTS.—Made from cable 12 feet above the gage or by wading.

CHANNEL AND CONTROL.—Sand and small gravel; shifting. Banks are steep, brushy, and will overflow at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.60 feet at 3.45 p. m. March 11 (discharge, 371 second-feet); no flow October 1 to February 20 and April 24 to September 30.

DIVERSIONS.—None.

REGULATION.—Flow completely regulated by San Pablo dam.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve fairly well defined. Gage read to half-tenths twice daily; and more often during storms. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

COOPERATION.—Gage-height record and measurements furnished by East Bay Water Co.

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Discharge measurements of San Pablo Creek at San Pablo, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 21	Taylor and Howe	1.95	68	Feb. 23	Taylor and Howe	2.25	111
21	do	1.20	35	Mar. 11	Howe and Casey	2.82	220
21	do	1.02	25	11	do	1.97	100
21	do	1.00	20	11	do	4.30	342
22	do	.85	12	11	do	4.57	357
23	do	3.60	243	11	do	4.05	286

Daily discharge, in second-feet, of San Pablo Creek at San Pablo, Calif., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.
1		2	2	11		106	0.7	21	26	9	0.1
2		2	1	12		114	.7	22	12	9	.6
3		2	1	13		27	1	23	76	9	.3
4		2	1	14		14	1.2	24	2	9	
5		2	.6	15		9	1.2	25	2	9	
6		2	.6	16		9	1.2	26	2	9	
7		2	.5	17		9	1	27	2	9	
8		2	.5	18		9	.6	28	2	9	
9		2	1.2	19		55	.1	29		9	
10		5	1	20		12	.1	30		7	
								31		4.5	

NOTE.—No flow Oct. 1 to Feb. 20 and Apr. 24 to Sept. 30. Gage not read Feb. 24 and 25; discharge estimated.

Monthly discharge of San Pablo Creek at San Pablo, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February	76	0	4.4	244
March	114	4.5	15.5	953
April	2	0	.6	35.7
The year	114	0	1.7	1232.7

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KERN RIVER BASIN.

KERN RIVER NEAR KERNVILLE, CALIF.

LOCATION.—In sec. 14, T. 23 S., R. 32 E., at base of Fairview Mountain, in Tulare County, in Kern National Forest, 3 miles above Salmon Creek and about 15 miles north of Kernville, Kern County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank about 1 mile above mouth of Tobias Creek. Original gage was vertical staff in three sections fastened to overhanging willow tree on left bank about 160 feet above recorder. From April 1 to September 14, 1913, readings were taken from a temporary staff gage in two sections located one-fourth mile upstream. The readings were reproduced to the original datum by a relation curve. The first gage was replaced March 17, 1914, by a vertical staff in two sections, 7 feet downstream from the original one, on the same bank and at the same datum. The recorder was installed September 15, 1913, in the same pool and at the same datum.

DISCHARGE MEASUREMENTS.—Made from cable about 90 feet below recorder or by wading.

CHANNEL AND CONTROL.—Coarse gravel and boulders; appear permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.79 feet at 9 a. m. May 5 (discharge, 1,850 second-feet); minimum stage from water-stage recorder, −0.40 foot at 3 p. m. February 18 (discharge, 200 second-feet).

1912–1918: Maximum stage recorded, 8.8 feet from water-stage recorder at 4 p. m. January 17, 1916 (discharge, 9,690 second-feet); minimum stage recorded, −0.75 foot January 6, 1913 (discharge, 142 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation not changed since station was established. Rating curve well defined below 6,000 second-feet and is an extension above. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records good.

COOPERATION.—Station maintained in cooperation with Southern California Edison Co. through H. W. Dennis, construction engineer.

Discharge measurements of Kern River near Kernville, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Nov. 5	−0.24	236
5	−0.24	237

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Daily discharge, in second-feet, of Kern River, near Kernville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	262	240	242	234	237	298	860	1,110	1,080	1,360	421	312
2	268	240	242	232	238	315	860	1,210	1,240	1,240	470	290
3	275	240	234	232	234	312	725	1,320	1,520	1,180	435	278
4	268	236	228	234	234	310	652	1,600	1,810	1,110	394	265
5	262	234	238	236	236	298	630	1,770	2,040	1,040	364	262
6	255	248	238	236	236	325	630	1,680	2,310	950	346	250
7	255	252	228	240	305	488	608	1,520	2,450	892	325	240
8	255	248	222	238	240	435	652	1,440	2,450	834	312	242
9	252	245	222	230	234	335	725	1,240	2,500	775	302	240
10	252	240	224	230	232	361	750	1,140	2,600	750	290	240
11	255	242	224	222	230	565	802	1,010	2,800	675	290	238
12	260	240	220	232	227	545	860	980	3,000	630	290	236
13	262	238	218	240	224	452	890	980	3,000	675	298	234
14	260	234	230	230	222	428	775	1,110	3,110	675	367	245
15	262	234	220	230	220	432	750	1,140	2,800	608	364	245
16	262	236	216	238	216	432	775	1,080	2,450	565	335	240
17	268	238	220	240	245	424	860	1,040	2,500	525	315	236
18	258	238	222	240	230	488	980	1,010	2,800	505	300	228
19	255	236	224	236	234	545	1,040	1,010	3,220	505	290	220
20	255	237	222	218	258	545	1,110	1,110	3,000	505	278	216
21	255	237	222	212	268	545	1,180	1,210	3,000	488	268	212
22	252	238	220	222	292	525	1,280	1,240	2,600	470	262	245
23	250	242	218	228	298	505	1,280	1,240	2,360	452	256	288
24	248	240	228	230	302	525	1,240	1,280	1,120	432	252	262
25	248	240	228	230	310	565	1,280	1,320	1,860	404	252	240
26	245	240	242	231	315	565	1,240	1,280	1,730	388	258	232
27	242	240	242	232	318	585	1,180	1,180	1,730	370	262	265
28	242	240	238	233	298	585	1,180	1,080	1,680	370	265	397
29	240	240	234	234	.....	630	1,180	1,010	1,560	364	280	775
30	240	240	234	235	.....	675	1,180	950	1,360	355	292	1,110
31	240	.....	232	236	.....	750	.....	950	.....	373	300	.....

NOTE.—No gage-height record Nov. 20–21, Jan. 26 to Feb. 1, Feb. 10–14, and July 7–8; discharge interpolated.

Monthly discharge of Kern River near Kernville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	275	240	255	15,700
November	252	234	240	14,300
December	242	216	228	14,000
January	240	212	232	14,300
February	318	216	254	14,100
March	750	298	477	29,300
April	1,280	608	938	55,800
May	1,770	950	1,200	73,800
June	3,110	1,080	2,290	136,000
July	1,360	355	660	40,600
August	470	252	314	19,300
September	1,110	212	299	17,800
The year	3,110	212	615	445,000

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KERN RIVER NEAR BAKERSFIELD, CALIF.[1]

LOCATION.—In sec. 2, T. 29 S., R. 28 E., at mouth of lower canyon, 5 miles northeast of Bakersfield, Kern County.

DRAINAGE AREA.—2,345 square miles.

RECORDS AVAILABLE.—January 1, 1894, to June 30, 1907, and March 1, 1908, to September 30, 1918.

GAGE.—Water-stage recorder on left bank at footbridge.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Shifting sand.

EXTREMES OF DISCHARGE.—1896–1918: Maximum stage recorded, January 26, 1914 (discharge, 18,287 second-feet); minimum stage recorded, September 15, 1898 (discharge, 80 second-feet).

DIVERSIONS.—Several small diversions on main river and South Fork for irrigation. Water diverted at and below Kernville, for power development is returned to the river above the station.

REGULATION.—No information.

ACCURACY.—Records considered good.

COOPERATION.—Complete record, except run-off in acre-feet, furnished by Kern County Land Co., through A. K. Warren, engineer.

Daily discharge, in second-feet, of Kern River near Bakersfield, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	289	290	306	336	285	434	1,128	1,376	1,054	1,370	376	303
2	300	284	314	340	272	431	1,228	1,279	1,146	1,391	411	324
3	301	278	328	346	277	446	1,254	1,296	1,370	1,270	450	311
4	308	277	322	339	286	463	1,148	1,374	1,632	1,198	476	287
5	307	287	314	338	299	466	1,038	1,579	1,899	1,148	457	280
6	298	304	318	335	300	464	982	1,735	2,151	1,043	425	281
7	292	305	332	331	306	463	974	1,679	2,405	988	400	272
8	291	324	328	321	330	585	947	1,550	2,509	882	381	269
9	291	325	321	314	361	815	983	1,474	2,553	843	373	261
10	290	331	332	304	312	642	1,045	1,324	2,607	816	356	252
11	285	330	319	295	301	597	1,100	1,213	2,747	782	333	251
12	277	338	319	279	299	892	1,141	1,107	2,850	737	323	241
13	272	335	314	295	298	1,015	1,213	1,065	3,054	687	314	243
14	283	337	303	309	299	910	1,303	1,050	3,126	676	304	249
15	295	325	298	312	292	800	1,151	1,122	3,098	723	335	257
16	296	323	296	308	278	727	1,099	1,169	2,737	672	369	280
17	295	315	292	311	277	687	1,038	1,105	2,439	633	350	279
18	291	317	298	320	307	688	1,206	1,107	2,345	595	331	277
19	286	325	302	319	347	868	1,302	1,096	3,052	571	321	272
20	277	311	306	316	330	1,124	1,337	1,110	3,040	553	312	267
21	279	295	307	306	356	1,008	1,360	1,208	3,162	551	305	254
22	278	299	308	288	381	1,004	1,449	1,258	2,949	542	299	242
23	280	315	304	282	407	980	1,505	1,316	2,658	534	302	243
24	282	312	304	280	430	931	1,550	1,326	2,321	528	288	286
25	286	306	311	288	436	942	1,563	1,380	2,027	483	279	271
26	293	303	316	293	435	953	1,572	1,401	1,805	435	274	264
27	301	301	319	292	427	945	1,533	1,378	1,641	411	263	296
28	317	307	340	295	430	995	1,511	1,234	1,584	398	252	362
29	314	314	330	281	.....	952	1,490	1,166	1,532	398	253	469
30	304	308	329	279	.....	973	1,418	1,133	1,454	376	277	706
31	303	.....	337	284	.....	1,043	.....	1,088	.....	367	301	.....

[1] Station also known as at "first point of measurement."

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Monthly discharge of Kern River near Bakersfield, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	322	266	292	18,000
November	349	275	311	18,500
December	366	290	315	19,400
January	348	271	306	18,900
February	448	264	334	18,500
March	1,155	426	782	48,100
April	1,614	865	1,252	74,500
May	1,769	1,022	1,280	78,700
June	3,478	1,025	2,298	137,000
July	1,454	365	729	44,800
August	483	246	338	20,800
September	955	227	295	17,600
The year	3,478	227	711	515,000

NOTE.—Record of maximum, minimum, and mean discharge furnished by Kern County Land Co.; maximum and minimum were determined from absolute maximum and minimum gage heights as recorded by company's water-stage recorder. Run-off in acre-feet computed by engineers of United States Geological Survey.

TULARE LAKE BASIN.

TULARE LAKE IN KINGS COUNTY, CALIF.

LOCATION.—At head gate at corner of north-south and east-west levees on G. Albert Smith ranch, at quarter corner between secs. 8 and 17, T. 21 S., R. 20 E., about 5 miles southwest of Stratford.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 15, 1906, to September 30, 1918 (incomplete). All published records give actual depth of water on the lowest point of the lake bed.

GAGE.—Vertical staff in three sections, two fastened to the head gate, high-water section at junction of Smith's levee and the Empire levee, 2 miles north; read by Ernest Coonradt. Gage readings reduced to depth of water from the following data: Elevation of bottom of lake, 179.1 feet above mean sea level; elevation of zero of gage, 176.4 feet.

During 1906 and a part of 1907 the readings were made from a gage near the entrance of Kings River near Lemoore, at the middle of sec. 4, T. 21 S., R. 20 E.; zero of that gage was at elevation 175.1 feet. May 11, 1907, a staff gage was set near Corcoran, with its datum at the same elevation, and was used until July 30, 1909. July 28, 1910, a vertical staff was installed on the section line just south of the corner of secs. 27, 28, 33, and 34, T. 20 S., R. 20 E., about 10 miles south of Lemoore, near Stratford post office; elevation of the zero of this gage, 171.0 feet. August 20, 1913, a vertical staff in four sections was installed in main north and south waterway, 4 to 6 miles southeast of Stratford; its zero was also at elevation 171.0 feet. Sections No. 1 and No. 2 were 1 mile south of gage used in 1910 in sec. 3, T. 21 S., R. 20 E. No. 3 was in sec. 10 and No. 4 was in sec. 15, 1 mile and 2 miles, respectively, south of sections Nos. 1 and 2.

Present gage was installed May 15, 1914, on account of the rebuilding of the levees. The high-water section on the levee near by, added July 16, 1916, was used up to October 28, 1916. The present high-water section was installed October 28, 1916.

EXTREMES OF STAGE.—Maximum depth recorded during year, 6.45 feet October 6; minimum depth recorded, 2.4 feet September 22.

1906–1918: Maximum depth, 14.0 feet June 21, 1907; the lake was empty a period in 1906, the last part of October to the last part of December, 1914, and the last part of November, 1916.

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The lake is roughly rectangular in shape and its greatest length is from northwest to southeast. In November, 1907, when its margin was carefully determined, the lake had a maximum depth of 12.4 feet, an average length of 20 miles, a width of 13.5 miles, and an area of about 274 square miles; the water's edge was 3 miles from the town of Corcoran, and the water surface about 12 feet below.

The lake bed resembles a flat saucer. The flat, level area in the bottom is about 180 feet above mean sea level and covers about 55 square miles. The lowest point on the crest of the delta ridge to the north is about 27 feet higher than the bottom of the lake. Natural outflow will not occur, therefore, until the lake has a maximum depth of nearly 30 feet and an area of nearly 1,000 square miles.

Daily depth, in feet, of Tulare Lake in Kings County, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1										4.8		
2									5.1			
3												
4												
5		n 6.0			(se)							
6	6.45											
7												
8												
9						6.25						
10			5.6									
11		s 6.1						5.7				2.8
12						sw 6.4						
13					n 5.6							
14							6.2					
15												
16												
17									5.0			
18											n 3.3	
19		n 6.0				6.4						
20												
21	n 6.2											
22					6.1							2.4
23												
24												
25		n 5.8				6.4		5.3				
26				5.7								
27			s 5.8							4.0	3.1	
28	n 6.1											
29						6.35						
30												
31												

n Wind blowing from north; s wind from south; se wind from southeast; sw wind from southwest.

DEER CREEK AT HOT SPRINGS, CALIF.

LOCATION.—Below footbridge at forest supervisor's headquarters in Sequoia National Forest, half a mile below Hot Springs, Tulare County. Tyler Creek enters about 2½ miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 7, 1910, to September 30, 1918.

GAGE.—Vertical staff fastened to an alder tree on left bank, 30 feet below footbridge; read by employees of United States Forest Service.

DISCHARGE MEASUREMENTS.—Made from highway bridge, 100 feet below gage or by wading.

CHANNEL AND CONTROL.—Sand, gravel, and boulders; fairly permanent.

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EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.2 feet March 27 (discharge, 36 second-feet); minimum stage recorded, 0.35 foot July 26 to September 16 (discharge, 1.2 second-feet).

1910–1918: Maximum stage recorded, 4.5 feet at 4 p. m. January 27, 1916 (discharge, from extension of rating curve, about 540 second-feet); minimum stage recorded, 0.24 foot August 14 to 16, 1913 (discharge, 0.8 second-foot).

DIVERSIONS.—Water is diverted for irrigation above the station.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined between 2 and 40 second-feet and is an extension above. Gage read to half-tenths once daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was made by Charles Leidl:

November 1, 1917: Gage height, 0.47 foot; discharge, 3.1 second-feet.

Daily discharge, in second-feet, of Deer Creek at Hot Springs, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept
1	1.7	3.0	3.8	3.8	3.8	6.5	16	6.5	3.8	1.7	1.2	1.2
2	1.7	3.4	5.2	3.8	3.8	6.5	14	6.5	3.8	1.7	1.2	1.2
3	1.7	3.8	3.8	3.8	3.8	8.2	14	6.5	3.8	1.7	1.2	1.2
4	1.7	3.8	3.8	3.8	3.8	9.8	14	6.5	3.8	1.7	1.2	1.2
5	1.7	3.8	3.8	3.8	3.8	6.5	14	6.5	3.8	1.7	1.2	1.2
6	1.7	5.2	3.8	3.8	3.8	6.5	9.8	6.5	3.8	1.7	1.2	1.2
7	1.7	5.2	3.8	3.8	16	9.8	9.8	6.5	3.8	1.7	1.2	1.2
8	1.7	[a] 5.2	3.8	3.8	9.8	14	9.8	8.2	3.8	1.7	1.2	1.2
9	1.7	[a] 5.2	3.8	4.3	5.2	9.8	9.8	9.8	3.4	1.7	1.2	1.2
10	1.7	[a] 5.2	3.8	3.8	3.8	16	9.8	8.2	3.4	1.7	1.2	1.2
11	1.7	[a] 5.2	3.8	3.8	6.5	14	9.8	[a] 8.2	2.8	1.7	1.2	1.2
12	1.7	[a] 5.2	3.8	3.8	3.8	14	9.8	[a] 8.2	2.8	1.7	1.2	1.2
13	1.7	[a] 5.2	3.8	6.5	3.8	18	14	8.2	2.8	1.7	1.2	1.2
14	1.7	[a] 3.8	3.8	5.2	3.8	16	12	8.2	2.8	1.7	1.2	1.2
15	1.7	[a] 3.8	3.8	6.5	3.8	12	12	6.5	2.8	1.7	1.2	1.2
16	1.7	[a] 3.8	3.8	3.8	3.8	9.8	12	6.5	2.1	1.7	1.2	1.2
17	1.7	[a] 3.8	3.8	3.8	3.8	9.8	9.8	6.5	2.1	1.5	1.2	1.5
18	1.7	[a] 3.8	3.8	3.8	6.5	9.8	12	6.5	2.1	1.5	1.2	1.5
19	1.7	[a] 3.8	3.8	3.8	3.8	30	12	6.5	2.1	1.5	1.2	1.5
20	1.7	3.8	3.8	3.8	6.5	18	9.8	6.5	2.1	1.5	1.2	1.5
21	1.7	3.8	3.8	3.8	6.5	16	9.8	6.5	1.7	1.5	1.2	1.7
22	1.7	3.8	3.8	3.8	9.8	14	9.8	6.5	1.7	1.5	1.2	1.7
23	1.7	3.8	3.8	3.8	6.5	9.8	9.8	6.5	1.7	1.5	1.2	1.7
24	1.7	3.8	[a] 3.8	3.8	6.5	9.8	9.8	6.5	1.7	1.5	1.2	1.7
25	1.7	3.8	[a] 3.8	3.8	8.2	9.8	9.8	6.5	1.7	1.5	1.2	1.7
26	1.7	3.8	[a] 3.8	3.8	8.2	9.8	9.8	6.0	1.7	1.2	1.2	1.7
27	1.7	3.8	[a] 3.8	3.8	6.5	36	9.8	6.0	1.7	1.2	1.2	2.8
28	2.8	3.8	3.8	3.8	6.5	14	[a] 9.0	5.2	1.7	1.2	1.2	2.8
29	2.8	3.8	3.8	3.8	.....	14	[a] 8.2	5.2	1.7	1.2	1.2	2.8
30	2.8	3.8	3.8	3.8	.....	14	[a] 7.4	5.2	1.7	1.2	1.2	2.8
31	2.8	.....	3.8	3.8	.....	16	.....	3.8	.....	1.2	1.2	.....

[a] Interpolated.

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Monthly discharge of Deer Creek at Hot Springs, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet).
	Maximum.	Minimum.	Mean.	
October	2.8	1 7	1.84	113
November	5.2	3.0	4.13	246
December	5.2	3.8	3.85	237
January	6.5	3.8	4.04	248
February	16	3.8	5.80	322
March	36	6.5	13.2	812
April	16	7.4	10.9	649
May	9.8	3.8	6.69	411
June	3.8	1.7	2.62	156
July	1.7	1.2	1.55	95.3
August	1.2	1.2	1.20	73.8
September	2.8	1.2	1.55	92.2
The year	36	1.2	4.77	3,460

TULE RIVER NEAR PORTERVILLE, CALIF.

LOCATION.—In NW. ¼ NW. ¼ sec. 25, T. 21 S., R. 28 E., below highway bridge near McFarland ranch, about a mile above mouth of South Fork and 6 miles east of Porterville, Tulare County. North and Middle forks of Tule River unite about 9 miles above station.

DRAINAGE AREA.—266 square miles.

RECORDS AVAILABLE.—May 1, 1901, to September 30, 1918.

GAGE.—Vertical staff in four sections on right bank, 75 feet below bridge. Original gage was on the same bank 200 feet below bridge and at same datum. There have been several changes in the number and kinds of staff sections, but the same datum has been maintained. Gage read by G. B. Kieffer.

DISCHARGE MEASUREMENTS.—Made from bridge above gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shift slightly during high water. Left bank low and wooded; subject to overflow above a stage of about 6 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.0 feet at 7 p. m. March 18 (discharge, 900 second-feet); minimum stage recorded, 0.09 foot at 6 p. m. September 5 (discharge, 0.7 second-foot).

1901-1918: Maximum stage recorded, 11.0 feet at 11.30 p. m. January 17, 1916 (discharge, determined from extension of rating curve, about 6,780 second-feet); minimum stage recorded, 0.09 foot at 6 p. m. September 5, 1918 (discharge, 0.7 second-foot).

DIVERSIONS.—Several small irrigation ditches divert water above the station.

REGULATION.—Power is developed on the Middle Fork and on the North and South forks of the Middle Fork.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve fairly well defined below 3,000 second-feet, and extended above. Gage read to hundredths twice daily. Daily discharge ascertained by applying gage height to discharge table. Records good.

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Discharge measurements of Tule River near Porterville, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 31	0.78	16
June 24	.84	23

Daily discharge, in second-feet, of Tule River near Porterville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9	19	32	38	30	60	243	115	69	7.5	1.2	0.9
2	11	19	32	35	29	61	230	116	62	7	1.2	.9
3	13	19	32	38	30	68	195	120	58	6.5	1.1	.9
4	11	20	34	35	30	68	150	126	56	6	1.1	.7
5	11	20	35	34	30	68	143	126	52	5	1.1	.7
6	10	27	35	35	30	72	137	121	51	4.8	1.1	.9
7	11	32	37	35	54	79	132	118	48	4.0	1.1	1.1
8	11	29	37	34	52	154	132	133	47	4.0	1.1	1.2
9	10	30	38	38	38	102	135	139	43	3.4	1.1	1.3
10	11	31	37	40	38	99	146	121	41	2.8	1.1	1.5
11	12	30	35	40	34	195	152	108	38	2.5	.9	1.7
12	11	32	34	40	32	218	152	105	38	2.5	.8	1.9
13	11	32	33	44	32	360	132	110	34	2.4	.8	1.9
14	11	30	34	47	30	195	133	96	32	2.1	.7	2.1
15	13	30	33	47	32	164	125	90	27	2.1	.7	1.5
16	14	30	33	46	30	152	120	88	25	2.1	.7	1.9
17	17	30	33	46	40	146	118	80	23	1.9	.7	1.9
18	20	31	33	46	135	427	126	77	22	1.7	.7	1.7
19	20	30	33	43	77	665	139	80	20	1.6	.7	1.7
20	19	30	34	42	63	445	154	77	20	1.4	.9	2.0
21	19	27	33	41	72	270	172	75	35	1.2	.9	2.0
22	19	30	33	38	77	243	174	72	23	1.2	1.0	2.1
23	18	30	33	38	77	184	174	68	20	1.1	.7	7
24	18	30	37	37	64	195	164	74	20	1.1	.7	6
25	19	30	35	35	90	184	164	74	18	1.1	.9	4.8
26	20	30	40	37	72	174	150	74	16	1.2	.9	4.2
27	20	30	42	38	64	410	139	74	14	1.2	.8	3.7
28	20	30	41	35	63	270	128	73	13	1.2	.7	4.4
29	20	30	42	34	.....	243	126	69	13	1.4	.9	6.5
30	20	30	40	32	.....	243	126	64	10	1.3	.9	11
31	19	.....	40	30	.....	243	.....	67	.....	1.1	.9	.....

Monthly discharge of Tule River near Porterville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	20	9	15.1	928
November	32	19	28.3	1,680
December	42	32	35.5	2,180
January	47	30	38.6	2,370
February	135	29	51.6	2,870
March	665	60	208	12,800
April	243	118	150	8,930
May	139	64	94.5	5,810
June	69	10	32.9	1,960
July	7.5	1.1	2.72	167
August	1.2	.7	.91	56.0
September	11	.7	2.67	159
The year	665	.7	55.2	39,900

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SOUTH FORK OF TULE RIVER NEAR PORTERVILLE,[1] CALIF.

LOCATION.—Opposite Indian School in Tule Indian Reservation, 2 miles below mouth of Rocky Creek, 7 miles southeast of Success, 8 miles above junction with Tule River, and 14 miles southeast of Porterville, Tulare County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 10, 1910, to September 30, 1918.

GAGE.—Vertical staff on right bank 30 feet above pump house, installed July 18, 1916; read by employees of Indian Service. Original gage was a vertical staff fastened to an alder tree 100 feet above pump house at a different datum.

DISCHARGE MEASUREMENTS.—Made from cable 1½ miles below gage or by wading.

CHANNEL AND CONTROL.—Rough; boulders and gravel; shifts slightly during high water. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.4 feet at 4 p. m. March 19 (discharge, 151 second-feet); minimum stage recorded, 0.48 foot August 8 to 24 and September 14 (discharge, 0.7 second-foot).

1910–1918: Maximum stage recorded, 8 feet at 8 a. m. January 26, 1914 (discharge, determined from extension of rating curve, about 2,750 second-feet); minimum stage recorded, 0.48 foot August 8–24 and September 14, 1918 (discharge, 0.7 second-foot).

DIVERSION.—Several small irrigation ditches, having a total capacity of about 12 second-feet, divert water above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined between 4 second-feet and 200 second-feet and is an extension above. Gage read to tenths once daily to April 30 and to quarter-tenths once daily, sometimes twice, from July 1. Daily discharge ascertained by applying mean daily gage height to rating table and interpolating for days on which gage was not read. Records good.

COOPERATION.—Gage-height record furnished by United States Indian Service, through Frank A. Virtue, superintendent.

Discharge measurements of South Fork of Tule River near Porterville, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 29	0.92	7.0
June 24	.90	6.5

[1] Originally known as "near Success."

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Daily discharge, in second-feet, of South Fork of Tule River near Porterville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	June.	July.	Aug.	Sept.
1	4.2	6.5	9.5	9.5	a 9.5	24	55	.....	4.2	0.8	1.0
2	4.2	6.5	9.5	9.5	a 9.5	24	46	.....	4.2	.8	1.4
3	4.2	6.5	9.5	9.5	a 9.5	a 24	46	.....	3.8	.8	1.4
4	4.2	6.5	9.5	a 9.5	9.5	24	38	.....	3.8	.8	1.8
5	4.2	6.5	9.5	9.5	9.5	18	31	.....	3.3	.8	1.8
6	4.2	14	9.5	9.5	9.5	24	31	.....	3.3	.8	1.8
7	4.2	9.5	9.5	9.5	55	77	31	.....	3.3	.8	1.4
8	4.2	9.5	9.5	9.5	55	31	31	.....	2.8	.7	2.2
9	4.2	9.5	9.5	14	46	31	31	.....	2.2	.7	2.2
10	4.2	9.5	9.5	14	46	31	38	.....	1.8	.7	2.2
11	4.2	9.5	9.5	14	38	31	38	.....	1.4	.7	2.4
12	4.2	9.5	9.5	a 14	38	89	38	.....	1.4	.7	2.4
13	4.2	9.5	9.5	a 14	38	55	46	.....	1.4	.7	2.4
14	4.2	9.5	a 9.5	14	38	38	31	.....	1.4	.7	.7
15	4.2	9.5	a 9.5	14	a 33	38	31	.....	1.4	.7	6
16	4.2	9.5	a 9.5	a 14	a 29	38	31	.....	1.2	.7	4.2
17	6.5	9.5	9.5	14	24	31	31	.....	1.2	.7	4.2
18	6.5	9.5	a 9.5	14	24	103	31	.....	1.2	.7	1.2
19	6.5	9.5	9.5	14	18	151	31	.....	1.2	.7	1.2
20	6.5	9.5	9.5	14	24	89	31	.....	1.1	.7	1.2
21	6.5	9.5	9.5	14	24	65	31	.....	1.3	.7	1.2
22	6.5	9.5	9.5	14	31	55	31	.....	1.3	.7	1.2
23	6.5	9.5	a 9.5	9.5	24	55	31	.....	1.2	.7	4.2
24	6.5	9.5	9.5	9.5	24	55	31	6.5	1.0	.7	4.2
25	6.5	9.5	9.5	9.5	24	55	31	.....	1.0	.8	4.2
26	6.5	9.5	9.5	9.5	24	46	31	.....	1.0	.8	3.8
27	6.5	9.5	14	a 9.5	24	89	31	.....	1.0	.8	7
28	6.5	9.5	14	9.5	24	55	24	.....	1.0	.8	14
29	7	9.5	9.5	9.5	.....	55	24	.....	.8	.8	9.5
30	6.5	9.5	a 9.5	9.5	.....	55	24	.....	.8	.8	12
31	6.5	.....	9.5	9.5	.....	46	.....	.....	.8	.8	.....

a Gage not read, discharge interpolated.

Monthly discharge of South Fork of Tule River near Porterville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	7	4.2	5.33	328
November	14	6.5	9.15	544
December	14	9.5	9.79	602
January	14	9.5	11.5	707
February	55	9.5	27.2	1,510
March	151	18	51.7	3,180
April	55	24	33.5	1,990
July	4.2	.8	1.83	113
August	.8	.7	.75	46.1
September	14	.7	3.48	207
The year	.....	.....	.....	.....

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KAWEAH RIVER NEAR THREE RIVERS, CALIF.

LOCATION.—In SE. ¼ sec. 27, T. 17 S., R. 28 N., at J. O. Carter's ranch, 1¼ miles southwest of Three Rivers, Tulare County. South Fork enters three-fourths mile and North Fork 3 miles above the station.

DRAINAGE AREA.—520 square miles.

RECORDS AVAILABLE.—April 29, 1903, to September 30, 1918.

GAGE.—Vertical staff gage in four sections on left bank a few feet above cable and one-fourth mile back of observer's house; read by Carter and Vickroy. The original gage was installed by the U. S. Geological Survey at same location and datum. December 5, 1912, the Weather Bureau gage was installed. For about two years the two gages were read interchangeably, according to varying conditions of repair of each. October 19, 1914, the Geological Survey repaired the upper section of the Weather Bureau gage and has used this gage to October 27, 1917, when the entire gage was rebuilt.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.1 feet at 7 a. m. March 19 (discharge, 1,570 second-feet); minimum stage recorded, 4.60 feet at 4.45 p. m. September 15 (discharge, 36 second-feet).

1903–1918: Maximum stage recorded, 13.5 feet at 11 a. m. January 17, 1916 (discharge, from extension of rating curve, about 14,700 second-feet); minimum stage recorded, 4.35 feet August 22, 1914 (discharge, 30 second-feet).

DIVERSIONS.—Several small ditches divert water for local irrigation and domestic use above the station.

REGULATION.—Power is developed on the Middle and East forks but effect is thought to be small.

ACCURACY.—Stage-discharge relation changed March 19. Rating curves well defined between 40 and 4,000 second-feet; extended above. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Gage not read April 21 to June 22; daily discharge not estimated but the monthly mean was estimated from the flow of the North and South forks and from the record for 1913. Records excellent except those for extreme high stages, which are probably good and for estimated periods, which are fair.

Discharge measurements of Kaweah River near Three Rivers, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 27	Charles Leidl	4.78	51	June 23	Charles Leidl	6.20	659
28	do	4.77	48	July 27	J. F. Kunesh	4.88	78

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Daily discharge, in second-feet, of Kaweah River near Three Rivers, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	June.	July.	Aug.	Sept.
1	55	47	54	55	52	139	660	.....	370	62	42
2	52	45	52	55	55	145	700	.....	322	71	42
3	55	47	60	55	52	152	830	.....	322	62	42
4	48	50	57	55	51	187	422	.....	322	62	48
5	47	42	52	52	60	165	422	.....	300	55	48
6	46	58	55	54	52	165	450	.....	259	62	42
7	52	81	55	54	255	365	422	.....	259	62	48
8	50	65	51	54	139	390	580	.....	222	55	48
9	47	65	48	57	255	247	930	.....	188	62	42
10	47	62	52	54	65	478	660	.....	172	55	42
11	44	62	52	50	88	1,180	980	.....	172	48	42
12	46	65	52	50	217	580	700	.....	188	48	48
13	52	60	48	60	65	545	660	.....	172	55	42
14	47	68	47	63	92	418	660	.....	142	48	42
15	45	55	44	66	77	340	785	.....	123	55	36
16	52	52	65	58	130	340	545	.....	128	62	42
17	58	58	50	60	155	318	660	.....	128	55	42
18	55	52	50	60	275	1,080	830	.....	102	48	42
19	50	55	51	58	295	1,400	880	.....	102	48	42
20	50	52	50	55	275	660	880	.....	91	48	42
21	50	55	52	63	130	1,300	.....	.....	91	42	48
22	50	52	50	52	165	480	.....	.....	80	48	42
23	50	52	46	57	169	450	.....	660	80	48	71
24	46	52	47	57	148	480	.....	510	71	48	66
25	47	50	50	55	206	510	.....	510	80	42	66
26	48	52	65	55	159	480	.....	450	71	42	59
27	47	52	98	57	152	1,030	.....	480	73	42	66
28	48	52	68	62	152	660	.....	450	62	48	71
29	50	51	62	55	.....	620	.....	422	71	48	345
30	50	52	55	55	.....	930	.....	345	71	42	280
31	48	.....	60	51	.....	660	.....	.....	62	42	.....

Monthly discharge of Kaweah River near Three Rivers, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 520 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	58	44	49.4	0.095	0.11	3,040
November	81	42	55.4	.107	.12	3,300
December	98	44	54.8	.105	.12	3,370
January	66	50	56.3	.108	.12	3,460
February	295	51	142	.273	.28	7,890
March	1,400	139	545	1.05	1.21	33,500
April	.....	422	[a] 789	1.52	1.70	46,900
May	.....	.....	[a] 1,060	2.04	2.35	65,200
June	.....	345	[a] 777	1.49	1.66	46,200
July	370	62	158	.304	.35	9,720
August	71	42	52.1	.100	.12	3,200
September	345	36	65.9	.127	.14	3,920
The year	.....	36	317	.610	8.28	230,000

[a] Estimated.

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NORTH FORK OF KAWEAH RIVER AT KAWEAH, CALIF.

LOCATION.—In SW. ¼ sec. 2, T. 17 S., R. 28 E., at highway bridge in Sequoia National Forest, half a mile north of Kaweah, Tulare County, and 2 miles above junction with Kaweah River, Manikin Creek enters one-fourth mile below and Sheep Creek 2½ miles above gage.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 12, 1910, to September 30, 1918.

GAGE.—Staff gage in two sections on right bank; low water section is inclined and fastened to abutment of bridge; upper section is vertical and fastened to sycamore tree 20 feet below bridge. Previous to flood of January, 1914, gage was vertical staff fastened to right abutment. Original datum has been maintained. Gage read by J. T. Weckert.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Solid rock and sand; fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.5 feet night of March 18–19 (discharge, 900 second-feet); minimum stage recorded, 0.12 foot August 31, September 1 and 6–8 (discharge, 1.7 second-feet).

1910–1918: Maximum stage recorded, 10.2 feet at 7 p. m. January 25, 1914 (discharge from extension of rating curve, about 7,400 second-feet); minimum stage recorded, 0.35 foot August 27, 1913 (discharge, 0.8 second-foot). Lower stages recorded gave larger discharges.

DIVERSION.—About 20 second-feet is diverted by several small ditches for irrigation above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed October 3. Rating curves coincide above 2.2 feet, are well defined between 2 and 500 second-feet, and are extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of North Fork of Kaweah River at Kaweah, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 28	Charles Leidl	0.48	6.9
June 23	.....do	.96	24
July 27	J. F. Kunesh	.38	5.0

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Daily discharge, in second-feet, of North Fork of Kaweah River near Keweah, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.5	7	9	12	10	41	198	154	63	15	3.5	1.7
2	5.5	7.5	9	12	10	46	171	156	65	24	2.8	1.8
3	5.0	7.5	9	11	10	46	147	179	62	26	2.5	1.8
4	5.5	7.5	9.5	11	11	46	132	184	63	21	2.5	1.9
5	5.5	7.5	9	11	11	47	132	163	59	15	2.5	1.8
6	5.5	8	9	12	11	48	136	171	59	12	2.4	1.7
7	5.5	8	9	12	37	168	122	147	56	11	2.5	1.7
8	5.5	8	9	12	32	149	158	176	55	10	2.5	1.7
9	5.5	8	9	12	21	86	163	147	51	9.5	2.6	1.8
10	5.5	8.5	9	13	18	58	179	136	46	9	2.9	1.8
11	6	8.5	9	13	17	405	195	127	43	8	2.5	2.1
12	6	8.5	8.5	13	17	219	219	163	39	8	2.5	2.3
13	6	9	8.5	14	16	235	156	136	37	8	2.5	2.5
14	6	9	8.5	15	16	127	145	127	35	7.5	2.4	2.5
15	6	8.5	8	16	16	116	156	118	33	7.5	2.8	2.5
16	6	8	8.5	14	16	112	168	110	32	7.5	2.9	2.5
17	6	8	9	14	33	108	195	102	30	7	3.0	2.5
18	6	8	9	13	33	184	219	100	27	6.5	3.0	2.5
19	6	8	9	12	24	695	219	97	26	6.5	2.8	2.5
20	6.5	8	9	12	24	206	232	102	28	6.5	2.5	2.5
21	6.5	8	9	12	27	136	245	100	28	6.5	2.4	2.5
22	6.5	8	9	12	46	138	228	99	27	6.5	2.4	2.6
23	6.5	8	9	11	48	134	242	91	24	6	2.5	2.8
24	6.5	8	9	11	45	151	238	97	22	6	2.5	3.0
25	6.5	8.5	11	11	65	127	225	91	21	5.5	2.3	3.2
26	6.5	8.5	18	11	49	140	190	102	20	5.5	2.1	3.3
27	6.5	9	22	10	36	430	190	82	16	5	2.1	3.3
28	7	9	13	10	35	184	163	86	16	5	2.0	3.4
29	7	8.5	12	10	.....	195	171	76	15	4.8	1.9	3.8
30	7	9	12	10	.....	201	156	77	15	4.0	1.8	5.5
31	7	.....	12	10	.....	212	.....	72	.....	3.7	1.7	.....

Monthly discharge of North Fork of Kaweah River at Kaweah, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	7	5	6.08	374
November	9	7	8.18	487
December	22	8.5	10.1	621
January	16	10	12.0	738
February	65	10	26.2	1,460
March	695	41	167	10,300
April	245	122	183	10,900
May	184	72	122	7,500
June	65	15	37.1	2,210
July	26	3.7	9.16	563
August	3.5	1.7	2.49	153
September	5.5	1.7	2.52	150
The year	695	1.7	48.9	35,500

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SOUTH FORK OF KAWEAH RIVER NEAR THREE RIVERS, CALIF.

LOCATION.—In SE. ¼ sec. 8, T. 18 S., R. 29 E., on Mehrten ranch, 500 feet above mouth of Cinnamon Creek, 4½ miles southeast of Three Rivers, Tulare County, and 5 miles above junction with Kaweah River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 18, 1911, to September 30, 1918.

GAGE.—Vertical staff fastened to large boulders on right bank; read by D. N. Mehrten.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet above gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; rough and fairly permanent. Banks subject to overflow at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.6 feet March 19 and May 5–7 (discharge, 217 second-feet); minimum stage recorded, 1.6 feet September 3–5 (discharge, 1.5 second-feet).

1911–1918: Maximum stage recorded, 6.3 feet at 7.45 a. m. January 17, 1916 (discharge from extension of rating curve, about 1,880 second-feet); minimum stage recorded, 1.6 feet September 3–5, 1918 (discharge, 1.5 second-feet).

DIVERSIONS.—Two small ditches divert water for irrigation above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed March 19. Rating curves coincide above 2.6 feet, are well defined below 500 second-feet, and are extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of South Fork of Kaweah River near Three Rivers, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 28	Charles Leidl	1.80	6.4
June 23	do	2.90	69
July 27	J. F. Kunesh	1.86	6.0

Daily discharge, in second-feet, of South Fork of Kaweah River near Three Rivers, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7.5	7.5	7	9.5	6.5	20	64	146	130	76	5.5	1.6
2	7.5	7.5	7	9.5	6.5	20	60	158	134	69	5	1.6
3	7.5	7.5	7	9.5	6.5	20	51	172	141	64	4.7	1.5
4	7.5	7.5	7	10	6.5	20	49	202	146	58	4.5	1.5
5	7.5	7.5	7	10	6.5	20	47	217	151	52	4.5	1.5
6	7.5	7.5	7	10	7	21	45	217	158	45	4.5	1.7
7	7	10	7	10	30	30	45	217	166	34	4.5	1.7
8	7	8.5	7	10	12	54	45	202	172	28	4.1	1.7
9	7	7.5	7	10	8.5	12	45	172	166	22	4.1	1.9
10	7	7.5	7	10	7.5	30	47	114	158	17	4.1	2.0
11	7	7.5	7	10	7	30	47	124	151	15	4.0	2.1
12	7	7.5	7	10	7	41	45	134	146	14	4.0	2.2
13	7	7.5	7	12	7.5	69	82	146	134	13	4.0	2.3
14	7	7.5	7	10	7.5	54	54	146	130	12	3.8	2.3
15	7	7.5	7	9.5	7.5	45	54	158	120	12	3.8	2.3
16	6.5	7.5	7	8.5	7	41	54	166	114	11	3.6	2.3
17	6.5	7.5	7	8	7.5	40	58	172	111	10	3.4	2.2
18	6.5	7.5	7	8	20	38	58	178	106	9.5	3.2	2.2
19	6.5	7.5	7	7.5	16	217	58	186	97	9.5	3.2	2.3
20	6.5	7	6.5	7.5	15	124	58	186	90	9	3.2	2.5
21	6.5	7	6.5	7.5	29	82	82	186	97	8.5	3.1	2.5
22	6.5	7	6.5	7	20	58	82	186	106	8.5	2.9	2.7
23	7	7	6.5	7	20	56	90	186	100	8	2.7	2.9
24	7	6.5	7	7	20	54	92	172	97	8	2.7	2.9
25	7	6.5	7	7	25	49	97	172	94	7.5	2.6	3.1
26	7	6.5	7.5	7	20	172	97	172	90	7.5	2.5	3.2
27	7.5	6.5	8.5	7	20	82	106	166	85	7.5	2.2	3.4
28	7.5	7	9	7	20	69	114	151	82	6.5	2.1	3.8
29	7.5	7	9	7	.....	66	124	141	78	6.5	2.0	4.0
30	7.5	7	9.5	7	.....	64	134	130	76	6	1.9	4.1
31	7.5	.....	9.5	6.5	.....	64	.....	124	.....	6	1.7	.....

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Monthly discharge of South Fork of Kaweah River near Three Rivers, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	7.5	6.5	7.06	434
November	10	6.5	7.37	439
December	9.5	6.5	7.29	448
January	12	6.5	8.60	529
February	30	6.5	13.3	739
March	217	12	56.8	3,490
April	134	45	69.5	4,140
May	217	114	168	10,300
June	172	76	121	7,200
July	76	6	21.3	1,310
August	5.5	1.7	3.49	215
September	4.1	1.5	2.40	143
The year	217	1.5	40.6	29,400

KINGS RIVER NEAR SANGER, CALIF.

LOCATION.—In NW. ¼ sec. 8, T. 13 S., R. 24 E., half a mile below new highway bridge at Piedra, near mouth of canyon, southwest of Red Mountain, and 12 miles northeast of Sanger, Fresno County.

DRAINAGE AREA.—1,740 square miles.

RECORDS AVAILABLE.—September 3, 1895, to September 30, 1918.

GAGE.—U. S. Weather Bureau inclined staff on left bank opposite original gage; read by C. D. Moore. Original gage was inclined staff on right bank. Friez water-stage recorder on right bank was used from April 18, 1903, to January 26, 1914, when it was destroyed by flood. Record on present gage began January 30, 1914. Same datum for all gages.

DISCHARGE MEASUREMENTS.—Made from cable 500 feet below gage.

CHANNEL AND CONTROL.—Gravel and small boulders; shift slightly during high water. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.0 feet at 7 a. m. June 12–14 (discharge, 13,500 second-feet); minimum stage recorded, 3.7 feet October 15–16, December 17–18, January 11–12 (discharge, 170 second-feet).

1895–1918: Maximum stage recorded, 21.8 feet during night of January 25, 1914, determined by leveling from flood marks (discharge, from extension of rating curve, about 59,700 second-feet); minimum stage recorded, 3.7 feet January 21, 1904 (discharge, 130 second-feet).

DIVERSIONS.—There is a small diversion for a flume used to float lumber to Sanger several miles above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed June 13. Rating curves well defined between 150 and 18,000 second-feet. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of Kings River near Sanger, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	Charles Leidl	3.78	197	June 21	Charles Leidl	11.12	10,100
Feb. 2	C. L. Kaupke	3.70	159	July 25	J. F. Kunesh	4.87	717
June 3	do	10.11	8,040	Aug. 27	Charles Leidl	4.04	288

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Daily discharge, in second-feet, of Kings River near Sanger, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	205	205	205	245	205	490	2,660	4,220	5,130	3,530	675	475
2	245	205	205	245	205	490	3,010	5,310	5,010	3,530	740	400
3	245	205	205	225	205	490	2,120	5,130	8,650	4,360	708	378
4	245	205	205	205	205	490	1,820	6,770	9,700	2,890	675	355
5	245	205	205	205	205	605	1,640	8,150	10,600	2,440	585	310
6	245	205	205	205	205	845	1,640	7,650	10,900	2,220	555	310
7	205	225	205	205	245	2,020	1,820	6,990	10,900	2,220	555	310
8	205	245	205	205	518	2,020	2,020	7,210	11,500	1,920	475	290
9	205	245	205	205	290	1,230	1,920	4,900	10,900	1,820	475	270
10	205	245	205	205	290	1,470	2,020	3,940	11,200	1,630	450	270
11	205	225	205	188	290	3,660	2,660	3,400	12,500	1,540	425	270
12	205	205	205	170	290	3,400	3,140	4,800	12,500	1,450	400	270
13	205	205	205	245	245	3,010	3,140	4,360	12,800	1,270	400	270
14	205	205	205	245	245	1,550	2,890	5,500	12,100	1,270	400	290
15	170	205	205	245	290	1,390	2,120	5,910	9,700	1,270	450	270
16	170	205	205	245	245	1,310	2,660	4,360	9,150	1,110	425	270
17	205	205	188	205	290	1,160	3,270	4,800	7,430	1,110	400	270
18	205	205	170	205	435	1,640	3,940	4,800	9,150	1,030	400	270
19	205	205	205	205	335	6,330	3,940	5,500	8,650	1,080	400	270
20	205	205	205	205	360	3,010	3,660	6,330	8,650	1,110	378	270
21	205	205	205	205	462	2,020	4,220	6,120	10,600	955	355	290
22	205	205	205	205	670	1,920	4,650	6,330	8,650	955	355	645
23	205	205	205	205	705	1,920	4,960	6,330	6,330	880	355	585
24	205	205	205	205	845	1,920	5,130	6,330	5,310	810	310	528
25	205	205	205	205	1,090	1,820	5,150	6,120	4,220	740	270	475
26	205	205	205	205	545	1,730	4,360	5,310	3,800	708	270	425
27	205	225	360	205	545	2,330	4,220	4,500	3,940	675	270	378
28	205	205	290	205	545	2,020	4,360	3,660	3,940	615	270	355
29	205	205	245	205	.....	2,020	4,500	3,660	3,530	615	270	1,540
30	205	205	245	205	.....	2,220	4,360	3,530	3,400	615	270	4,360
31	205	.....	245	205	.....	2,440	.....	3,940	.....	615	270	.....

Monthly discharge of Kings River near Sanger, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 1,740 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	245	170	209	0.120	0.14	12,900
November	245	205	211	.121	.14	12,600
December	360	170	215	.124	.14	13,200
January	245	170	212	.122	.14	13,000
February	1,090	205	393	.226	.24	21,800
March	6,330	490	1,900	1.09	1.26	117,000
April	5,130	1,640	3,270	1.88	2.10	195,000
May	8,150	3,400	5,350	3.07	3.54	329,000
June	12,800	3,400	8,390	4.82	5.38	499,000
July	4,360	615	1,510	.868	1.00	92,800
August	740	270	427	.245	.28	26,300
September	4,360	270	522	.300	.33	31,100
The year	12,800	170	1,880	1.08	14.69	1,360,000

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SAN JOAQUIN RIVER BASIN.

MAIN STREAM.

SAN JOAQUIN RIVER NEAR FRIANT, CALIF.

LOCATION.—In NW. ¼ sec. 5, T. 11 S., R. 21 E., 1½ miles northeast of Friant, Fresno County.

DRAINAGE AREA.—1,640 square miles at old location 2 miles upstream.

RECORDS AVAILABLE.—October 18, 1907, to September 30, 1918.

GAGE.—Gurley printing water-stage recorder on left bank, installed December, 9, 1913. Previous to that date the gage was a staff gage located on left bank in SE. ¼ sec. 34, T. 10 S., R. 21 E., about 4 miles northeast of Friant. Relation between old datum and new datum unknown.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet below gage, or by wading.

CHANNEL AND CONTROL.—Bed consists of sand and gravel. Control is a solid rock dyke about 500 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year unknown, incomplete record; minimum stage, from water-stage recorder, 3.28 feet December 17, 26, and January 28 (discharge, 231 second-feet).

1907–1918: Maximum stage recorded, 21.72 feet at 11.30 p. m. January 25, 1914 (discharge, 46,200 second-feet); minimum stage recorded, 3.25 feet October 17 to 19 and 22 to 29, 1913 (discharge, 170 second-feet).

DIVERSIONS.—Fresno Flume & Lumber Co. diverts about 10 second-feet from Stevenson Creek. This water is used for irrigation near Clovis.

REGULATION.—Storage is developed for power at Huntington Lake on Big Creek and at Crane Valley reservoir on North Fork Creek, and a small amount on Stevenson Creek at Shaver.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 240 and 18,000 second-feet and extended above. Water-stage recorder stopped three times during year and considerable record was lost. Mean daily gage height determined by averaging readings printed every 15 minutes by the water-stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent when recorder was running and fair for estimated periods.

Discharge measurements of San Joaquin River near Friant, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	Charles Leidl	3.85	396	July 26	J. F. Kunesh	5.16	931
June 21	do	11.16	9,920	Aug. 26	Charles Leidl	4.21	532

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Daily discharge, in second-feet, of San Joaquin River near Friant, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	June.	July.	Aug.	Sept.
1	.....	382	358	340	328	795	.....	.....	878	665
2	.....	364	331	313	322	822	.....	.....	932	600
3	.....	373	298	352	328	905	.....	.....	960	608
4	.....	361	349	361	288	878	.....	.....	932	613
5	.....	322	334	349	325	960	.....	.....	822	590
6	.....	370	331	352	319	1,020	.....	.....	850	595
7	.....	424	328	295	352	2,040	.....	.....	822	577
8	.....	410	319	340	795	4,130	.....	.....	795	568
9	.....	421	308	355	494	1,960	.....	.....	740	490
10	.....	400	265	355	394	1,400	.....	.....	715	530
11	.....	400	322	334	343	3,440	.....	.....	715	510
12	.....	361	322	298	388	3,830	.....	.....	613	494
13	.....	379	316	328	435	.....	.....	.....	690	452
14	.....	391	298	328	438	.....	.....	.....	715	502
15	.....	376	302	355	452	.....	.....	.....	715	1,240
16	.....	376	305	364	421	.....	.....	.....	715	850
17	.....	352	258	340	418	.....	.....	.....	690	690
18	.....	364	290	364	421	.....	.....	.....	640	600
19	.....	322	310	355	506	.....	.....	.....	526	572
20	.....	358	310	370	538	.....	.....	.....	600	554
21	.....	370	308	292	582	.....	9,400	.....	595	522
22	370	352	313	308	1,110	.....	9,900	.....	582	435
23	388	361	305	334	1,540	.....	7,700	.....	590	391
24	388	361	265	346	2,080	.....	5,910	.....	582	640
25	379	370	302	355	2,160	.....	.....	.....	577	586
26	388	340	282	343	1,020	.....	.....	990	494	542
27	379	355	424	310	905	.....	.....	960	572	536
28	376	358	394	265	850	.....	.....	960	586	435
29	340	346	382	285	.....	.....	.....	960	626	1,140
30	382	322	355	313	.....	.....	.....	960	640	7,010
31	370	.....	308	331	.....	.....	.....	878	665	.....

NOTE.—Discharge for periods for which gage height was not recorded estimated from flow of Kings River near Sanger and from the Weather Bureau gage heights at Friant as follows: Oct. 1-21, 430 second-feet; Mar. 13-31, 2,800 second-feet; Apr. 1-30, 3,000 second-feet; May 1-31, 5,000 second-feet; June 1-20, 9,400 second-feet; June 25-30, 4,700 second-feet; and July 1-25, 2,200 second-feet.

Monthly discharge of San Joaquin River near Friant, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	413	25,400
November	424	322	368	21,900
December	424	258	319	19,600
January	370	265	333	20,500
February	2,160	288	663	36,800
March	.....	.....	2,430	149,000
April	.....	.....	[a] 3,000	179,000
May	.....	.....	[a] 5,000	307,000
June	.....	.....	8,300	494,000
July	.....	.....	1,960	121,000
August	900	494	696	42,800
September	7,010	391	818	48,700
The year	.....	258	2,020	1,470,000

[a] Estimated.

SAN JOAQUIN RIVER NEAR NEWMAN, CALIF.

LOCATION.—In SW. ¼ sec. 3, T. 7 S., R. 9 E., at drawbridge on Hill's Ferry road, 300 feet below mouth of Merced River and 3½ miles northeast of Newman, Stanislaus County.

DRAINAGE AREA.—Not measured.

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RECORDS AVAILABLE.—April 29, 1912 to September 30, 1918.

GAGE.—Vertical staff fastened to upstream side of downstream support of draw span, 60 feet below the bridge in middle of stream. Gage read by Rasmus Lorensen.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Sand and small gravel; shifts during high water. Banks subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.7 feet at 7 a. m. March 14 (discharge, 13,400 second-feet); minimum stage recorded, 1.65 feet September 5-11 (discharge, 130 second-feet).

1912-1918: Maximum stage recorded, 18 feet at 9 a. m. January 27, 1914 (discharge, 20.700 second-feet); minimum stage recorded, 1 foot October 5 and 8-18, 1913 (discharge, 50 second-feet).

DIVERSIONS.—Practically the entire low-water flow of main river and tributaries is diverted for irrigation, hence the low-water records show the amount of return water.

REGULATION.—Storage is developed for power at Huntington Lake on Big Creek and at Crane Valley reservoir on North Fork Creek.

ACCURACY.—Stage-discharge relation not changed this year. Rating curve fairly well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of San Joaquin River near Newman, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 1	J. F. Kunesh	1.73	139
June 26	Charles Leidl	11.90	8,840
July 22	J. F. Kunesh	3.07	365

Daily discharge, in second-feet, of San Joaquin River near Newman, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	145	135	200	222	170	2,440	6,520	4,000	3,230	5,010	255	135
2	145	135	200	222	170	1,820	6,390	3,600	3,320	3,800	238	135
3	135	135	200	230	170	1,480	6,130	4,000	3,600	3,320	230	135
4	140	140	215	230	162	1,160	5,870	4,000	3,800	3,140	230	135
5	145	145	215	230	162	925	5,490	4,550	4,220	2,780	230	130
6	145	145	222	230	170	770	5,490	5,250	5,010	2,600	215	130
7	145	145	230	230	170	870	5,370	5,250	5,490	2,360	215	130
8	145	145	230	222	185	7,170	5,010	5,370	6,130	2,040	215	130
9	145	145	222	222	230	9,370	4,550	5,370	6,780	1,750	208	130
10	145	155	215	230	265	7,040	4,110	5,010	7,040	1,540	200	130
11	140	155	215	230	230	7,040	3,800	4,550	7,300	1,340	192	130
12	135	162	215	230	200	8,750	3,410	4,110	7,720	1,160	185	135
13	135	162	215	230	200	10,700	3,500	3,600	8,150	1,040	170	155
14	140	162	215	230	178	13,400	3,500	3,230	8,450	925	155	162
15	145	162	215	238	178	10,700	3,500	3,500	8,750	870	155	155
16	145	162	208	245	170	9,530	3,320	3,700	8,750	720	155	162
17	145	162	200	245	185	7,300	3,320	3,410	8,750	630	155	155
18	145	162	208	255	185	8,000	3,320	3,140	8,750	550	155	155
19	145	162	208	255	185	6,910	3,410	3,320	8,750	550	155	178
20	140	170	215	245	230	11,200	3,500	3,410	8,900	510	150	170
21	140	170	208	245	255	12,600	3,600	3,800	9,210	475	150	170
22	140	170	208	245	355	11,000	4,000	4,110	9,530	440	150	170
23	140	170	200	245	3,500	11,500	4,440	4,110	9,690	395	150	162
24	135	178	200	245	2,600	11,500	4,770	4,550	9,530	368	150	155
25	135	185	208	238	6,390	10,800	4,890	4,770	9,050	355	150	155
26	145	185	208	222	4,110	10,000	4,770	4,890	8,750	330	150	155
27	145	185	215	215	3,050	8,900	4,660	5,010	8,450	305	145	155
28	145	185	222	208	2,690	9,210	4,550	4,660	8,150	295	145	155
29	145	185	222	200	.....	7,860	4,440	4,330	7,860	285	140	155
30	145	185	230	170	.....	6,910	4,330	3,900	6,910	275	140	155
31	140	.....	230	170	.....	6,390	.....	3,500	.....	265	140	.....

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Monthly discharge of San Joaquin River near Newman, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	145	135	142	8,730
November	185	135	161	9,580
December	230	200	213	13,100
January	255	170	228	14,000
February	6,390	162	955	53,000
March	13,400	770	7,520	462,000
April	6,520	3,320	4,470	266,000
May	5,370	3,140	4,190	258,000
June	9,690	3,230	7,330	436,000
July	5,010	265	1,300	79,900
August	255	140	177	10,900
September	178	130	149	8,870
The year	13,400	130	2,240	1,620,000

FRESNO RIVER AND TRIBUTARIES.

FRESNO RIVER NEAR KNOWLES, CALIF.

LOCATION.—In N. ½ sec. 15, T. 8 S., R. 20 E., at Fresno crossing, 6 miles northeast of Knowles, Madera County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 16, 1911, to January 1, 1914; November 13, 1915, to September 30, 1918.

GAGE.—Vertical staff in two sections; low-water section is on left bank about 60 feet above bridge; high-water section is on right bank about 100 feet above bridge. There have been several changes in gage sections and the original datum probably has been maintained. Gage read by J. E. Gayman.

DISCHARGE MEASUREMENTS.—Made from cable about 300 feet below bridge or by wading.

CHANNEL AND CONTROL.—Bed consists of small boulders, gravel, sand, and outcroppings of bedrock; fairly permanent. A concrete control was installed November 4, 1916.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.5 feet at 12.30 p. m., March 19 (discharge, determined from extension of rating curve, about 2,710 second-feet); minimum stage recorded, 0.40 foot August 31 to September 2 (discharge, 0.7 second-foot).

1911–1914 and 1916–1918: Maximum stage recorded, 6.0 feet at 5 p. m. February 21, 1917 (discharge, determined from extension of rating curve, about 4,500 second-feet); minimum stage recorded, 0.40 foot August 31 to September 2, 1918 (discharge, 0.7 second-foot).

DIVERSIONS.—Water is diverted above the station for irrigation and lumbering.

REGULATION.—Diurnal fluctuation at low stages due to diversions above.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 5 and 400 second-feet and is extended above. Gage read to quarter-tenths once or twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except those for high water, which are fair.

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Discharge measurements of Fresno River near Knowles, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 31	J. F. Kunesh	0.72	5.3
31	do	.74	5.5
Aug. 24	Charles Leidl	.53	1.4

Daily discharge, in second-feet, of Fresno River near Knowles, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5	5.5	8	12	11	63	201	112	74	32	2.5	0.7
2	5	5.5	9.5	12	11	63	175	119	69	32	2.5	.7
3	5	5	12	14	12	63	126	119	69	29	2.2	.8
4	5	5	15	14	11	63	126	119	69	29	2.2	.9
5	4.5	5	14	15	11	69	134	119	69	26	2.5	.9
6	4.5	5.5	14	14	11	69	126	119	74	26	2.2	.9
7	4.5	15	12	12	42	1,360	112	119	74	26	2.2	1.0
8	4.5	9.5	12	12	55	582	98	119	69	15	2.2	1.1
9	4.5	8	8	11	24	312	91	210	69	15	1.9	1.1
10	4.0	8	8	11	24	210	91	166	69	14	1.9	1.1
11	4.0	7.5	9.5	9.5	22	367	91	112	69	14	1.9	1.1
12	3.5	8	9.5	9.5	19	1,170	91	112	63	12	1.7	1.1
13	3.5	8	8	15	19	650	98	112	63	8	1.7	1.4
14	3.5	8	8	14	19	312	91	112	59	7.5	1.7	1.7
15	4.0	7.5	9.5	14	19	210	85	105	59	7.5	1.4	15
16	4.0	7.5	9.5	14	22	210	85	98	59	8	1.4	15
17	4.5	7.5	8	12	22	166	80	91	55	8	1.1	8
18	4.5	8	8	12	42	166	80	91	55	8	1.1	7
19	5	8	8	12	55	2,490	85	91	50	7.5	1.1	5.5
20	5.5	7.5	8	12	91	720	80	91	46	7.5	1.4	2.5
21	5	7.5	9.5	11	126	425	80	85	42	7	1.1	2.5
22	4.5	8	9.5	11	455	312	80	85	42	7	1.1	2.5
23	4.5	9.5	9.5	11	166	260	85	80	42	6	1.1	2.5
24	4.5	11	9.5	9.5	1,120	240	91	80	39	5.5	1.4	1.1
25	5	9.5	9.5	9.5	312	240	91	80	42	5.5	1.1	1.1
26	5	8	11	9.5	210	685	112	80	42	5	1.1	1.1
27	5	7.5	26	8	91	312	119	80	39	5	1.0	1.1
28	5.5	7.5	15	8	91	302	119	80	39	4.5	.9	2.5
29	5	8	12	9.5	.....	291	112	80	36	4.0	.8	2.5
30	5	8	12	9.5	.....	270	112	85	36	4.0	.8	26
31	5.5	.....	12	9.5	.....	210	.....	80	.....	3.5	.7	.....

Monthly discharge of Fresno River near Knowles, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	5.5	3.5	4.61	283
November	15	5	7.80	464
December	26	8	10.8	664
January	15	8	11.5	707
February	1,120	11	111	6,160
March	2,490	63	415	25,500
April	201	80	105	6,250
May	210	80	104	6,390
June	74	36	56.1	3,340
July	32	3.5	12.5	769
August	2.5	.7	1.55	95.3
September	26	.7	3.68	219
The year	2,490	.7	70.3	50,800

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MERCED RIVER AND TRIBUTARIES.

MERCED RIVER AT HAPPY ISLES BRIDGE, NEAR YOSEMITE, CALIF.

LOCATION.—At Happy Isles Bridge, at power house 1½ miles southeast of Yosemite, Mariposa County.

DRAINAGE AREA.—181 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 23, 1915, to September 30, 1918.

GAGE.—Friez water-stage recorder in masonry well on right bank about 20 feet below bridge. Previous to November 2, 1916, record is from a staff gage fastened to downstream side of large boulder which is used for the right abutment of the bridge.

DISCHARGE MEASUREMENTS.—Made from Clark Bridge, about one-half mile below gage, or by wading.

CHANNEL AND CONTROL.—Boulders; considered permanent. Banks high; not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder 6.55 feet at 1 a. m., June 12 (discharge, 3,180 second-feet); minimum stage, from water-stage recorder, 0.13 feet at 11 a. m., January 9 (discharge, 2.1 second-feet). Regulated by power plant above.

1915–1918: Maximum stage recorded, 6.68 feet at 12.15 a. m., June 10, 1917 (discharge, 3,320 second-feet); minimum stage from water-stage recorder, 0.13 feet at 11 a. m., January 9, 1918 (discharge, 2.1 second-feet).

ICE.—Stage-discharge relation possibly slightly affected by ice.

DIVERSIONS.—None.

REGULATION.—Power plant above station; water returned to the river just above gage.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Mean daily gage height determined by inspecting recorder graph or by using planimeter for days during which there were wide fluctuations in stage. Daily discharge ascertained by applying mean daily gage height to rating table, except September 29 when hourly discharge was averaged. For periods of no record discharge estimated by comparison with the flow at Pohono Bridge (see footnote to daily discharge table). Records excellent except for periods when recorder did not work properly.

COOPERATION.—Gage-height record furnished by W. B. Lewis, superintendent of Yosemite National Park.

Discharge measurements of Merced River at Happy Isles Bridge, near Yosemite, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 25	J. F. Kunesh	0.54	13	Sept. 15	Charles Leidl	2.25	239
Aug. 27	H. D. McGlashan	.93	30	17	do	1.65	114
29	Charles Leidl	1.03	40				

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Daily discharge, in second-feet, of Merced River at Happy Isles Bridge, near Yosemite, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	27	17	16	17	56	337	846	1,100	910	105	60
2	26	17	17	16	60	328	952	1,380	798	116	51
3	25	16	15	15	76	256	1,170	1,620	685	106	45
4	25	14	15	17	88	218	1,380	1,740	599	99	39
5	24	14	15	15	88	209	1,380	2,050	513	91	36
6	24	19	13	12	86	220	1,280	2,280	427	80	32
7	24	19	13	13	92	233	1,170	2,420	382	70	29
8	23	18	15	12	79	256	1,040	2,470	328	64	29
9	22	17	16	10	66	314	746	2,520	328	60	29
10	22	17	15	10	84	343	585	2,570	297	56	28
11	22	18	15	12	111	373	495	2,720	259	54	26
12	22	18	14	13	86	388	554	2,820	233	52	26
13	21	18	15	12	81	355	795	2,820	220	50	27
14	20	17	15	14	80	300	1,070	2,720	208	49	154
15	20	17	14	14	86	306	1,040	2,520	196	47	272
16	19	17	13	15	93	337	746	2,240	194	45	158
17	18	17	15	15	95	414	795	1,740	184	44	116
18	18	17	15	15	112	500	712	1,830	172	42	86
19	17	15	15	.....	106	540	795	1,830	156	41	68
20	16	15	15	.....	100	615	970	1,920	158	40	56
21	16	15	14	.....	112	724	1,100	1,910	158	37	50
22	15	14	13	.....	124	856	1,140	1,900	147	35	54
23	14	14	16	.....	136	886	1,200	1,880	138	33	66
24	14	15	17	.....	158	892	1,240	1,870	126	32	67
25	13	15	19	.....	172	868	1,200	1,660	111	30	56
26	13	14	29	.....	172	751	970	1,460	99	33	48
27	14	15	26	.....	164	655	740	1,220	95	33	42
28	13	15	21	.....	154	675	585	970	93	37	56
29	14	15	18	.....	186	734	491	740	92	41	1,550
30	13	14	20	.....	225	746	491	825	92	46	1,000
31	15	.....	17	.....	292	.....	718	.....	93	54	.....

NOTE.—No gage-height record, intake pipe clogged, Oct. 13-24 and Jan. 19 to Feb. 28; discharge Oct. 13-24 interpolated; Jan. 19-31, estimated as 12 second-feet, and Feb. 1-28 as 32 second-feet. Staff gage read June 21 to July 5 and Sept. 7-10. No gage-height record Oct. 31, Nov. 23, Mar. 8, May 3, June 21-23-25, 27, 30, July 2, 4, 5, 14, Aug. 11-19 and Sept. 10: discharge interpolated.

Monthly discharge of Merced River at Happy Isles Bridge, near Yosemite, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 181 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	27	13	19.0	0.105	0.12	1,170
November	19	14	16.1	.089	.10	958
December	29	13	16.3	.090	.10	1,000
January	17	10	13.0	.072	.08	799
February	.....	.....	a 32.0	.177	.18	1,780
March	292	56	117	.646	.74	7,190
April	892	209	488	2.70	3.01	29,000
May	1,380	491	916	5.06	5.83	56,300
June	2,820	740	1,920	10.6	11.83	114,000
July	910	92	274	1.51	1.74	16,800
August	116	30	55.5	.307	.35	3,410
September	1,550	25	145	.801	.89	8,630
The year	2,820	10	334	1.85	24.97	241,000

a Estimated.

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MERCED RIVER AT POHONO BRIDGE, NEAR YOSEMITE, CALIF.

LOCATION.—At Pohono Bridge, 5 miles below Yosemite, Mariposa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 2, 1916, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank 150 feet above the bridge. Datum lowered 0.8 foot September 4, 1918.

DISCHARGE MEASUREMENTS.—Made from cable three-eighths mile below gage or by wading.

CHANNEL AND CONTROL.—Bed consists of sand and gravel. Control formed by boulders; permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 7.05 feet at 5 a. m. June 12 (discharge, 4,000 second-feet); minimum stage recorded, 0.18 foot February 2 (discharge, 19 second-feet).

ICE.—No ice forms at the control because of rapids.

DIVERSIONS.—None.

REGULATION.—The power plant at Happy Isles causes diurnal fluctuation.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 1,000 second-feet, well defined between 1,000 and 6,000 second-feet, and extended above. Mean daily gage height determined by inspecting recorder graph except October 26 to February 2 and February 9, 13, 16, and August 27 to September 4, when staff gage was used. Daily discharge ascertained by applying the mean daily gage height to the rating table. Records good.

COOPERATION.—Gage-height record furnished by W. B. Lewis, superinteudent of Yosemite National Park.

Discharge measurements of Merced River at Pohono Bridge, near Yosemite, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 26	J. F. Kunesh	0.27	27	Aug. 29	Charles Leidl	0.56	56
Aug. 27	H. D. McGlashan	.51	47	Sept. 16	do	2.25	188

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Daily discharge, in second-feet, of Merced River at Pohono Bridge, near Yosemite, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	25	29	a 24	a 20	76	720	1,840	1,920	943	121	73
2	.....	25	29	a 24	19	90	768	2,080	2,260	1,090	133	71
3	.....	25	28	a 24	a 25	108	556	2,120	2,530	1,090	130	a 66
4	.....	25	27	a 24	a 30	134	472	2,620	2,720	792	115	60
5	.....	24	27	24	a 36	138	456	2,720	2,920	653	115	a 62
6	.....	28	26	a 23	42	136	488	2,580	3,020	596	105	a 64
7	.....	32	26	a 22	87	194	484	2,400	3,220	513	103	a 65
8	.....	31	25	a 22	50	176	552	2,040	3,320	441	.....	a 67
9	.....	30	24	21	48	152	672	1,580	3,120	422	.....	a 69
10	.....	29	24	a 21	a 48	182	768	1,300	3,320	392	.....	a 71
11	.....	29	23	a 21	a 49	279	866	1,150	3,520	334	.....	a 73
12	.....	30	23	21	a 50	243	943	1,240	3,730	297	.....	a 75
13	.....	29	23	a 22	50	196	838	1,640	3,620	277	.....	76
14	.....	29	24	a 24	a 47	186	696	2,080	3,520	266	.....	108
15	.....	28	24	a 25	a 44	186	720	2,000	3,220	245	.....	297
16	.....	28	a 24	26	41	203	792	1,540	2,920	236	.....	180
17	.....	28	a 24	a 26	48	217	970	1,640	2,260	221	.....	132
18	.....	28	a 24	a 26	a 49	255	1,180	1,540	2,260	207	.....	104
19	.....	28	a 24	a 26	a 49	274	1,240	1,760	2,220	192	.....	88
20	.....	27	a 24	26	50	236	1,400	2,120	2,260	190	.....	76
21	.....	27	a 25	a 25	51	238	1,640	2,220	2,440	184	.....	70
22	.....	27	a 25	a 24	66	266	1,960	2,260	2,040	174	.....	69
23	.....	26	a 26	23	62	282	2,080	2,300	1,720	161	.....	71
24	.....	26	a 25	a 23	74	322	2,000	2,260	1,440	150	.....	74
25	.....	26	a 25	a 22	62	364	1,840	2,170	1,150	134	.....	68
26	27	26	25	22	68	385	1,580	1,920	1,120	127	.....	65
27	a 26	26	a 25	a 22	69	361	1,440	1,500	1,120	121	49	64
28	26	26	a 25	a 21	71	328	1,500	1,270	1,090	120	a 52	65
29	26	25	a 25	21	.....	371	1,680	1,120	970	118	55	1,150
30	26	25	a 25	a 20	.....	468	1,610	1,090	891	118	61	1,270
31	26	.....	a 25	a 20	.....	601	.....	1,440	.....	117	65	.....

a Interpolated; no gage-height record.

NOTE.—Discharge Oct. 1-25 estimated as 31 second-feet; Aug. 8-26, 76 second-feet.

Monthly discharge of Merced River at Pohono Bridge, near Yosemite, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	30.1	1,850
November	32	24	27.3	1,620
December	29	23	25.1	1,540
January	26	20	23.1	1,420
February	87	19	50.2	2,790
March	601	76	247	15,200
April	2,080	456	1,100	65,500
May	2,720	1,090	1,850	114,000
June	3,730	891	2,400	143,000
July	1,090	117	352	21,600
August	133	.....	82.2	5,050
September	1,270	60	161	9,580
The year	3,730	19	528	383,000

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MERCED RIVER AT EXCHEQUER, CALIF.

LOCATION.—In SW. ¼ NE. ¼ sec. 13, T. 4 S., R. 15 E., just above remains of old dam at Exchequer, Mariposa County, just above mouth of Cotton Creek, and 8 miles upstream from Merced Falls.

DRAINAGE AREA.—1,020 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 28, 1915, to September 30, 1918.

GAGE.—Vertical staff in four sections bolted to solid rock ledge on right bank 250 feet above old dam; read by Trunnel and Stewart.

DISCHARGE MEASUREMENTS.—Made from cable one-half mile above gage or by wading.

CHANNEL AND CONTROL.—Bed consists of boulders, gravel, and solid rock. Control is old concrete dam. Banks high, clean, and not likely to be overflowed. Part of dam was blasted February 1, 1918, to make a fishway.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.5 feet at 4 p. m. March 7, 6 p. m. March 12, and 10 a. m. March 19 (discharge, determined from extension of rating curves, about 17,700 second-feet); minimum stage recorded, 4.3 feet at 7 a. m. September 1 (discharge, 21 second-feet).

1915–1918: Maximum stage recorded, 20.0 feet at 4 p. m. January 17, 1916 (discharge, determined from extension of rating curve, about 22,000 second-feet); minimum stage recorded September 1, 1918.

DIVERSIONS.—None.

REGULATION.—The several small power plants above have little or no storage. The effect of their operation is believed to be slight except during low water.

ACCURACY.—Stage-discharge relation changed February 1, when part of dam was blasted to make a fishway. Rating curves well defined below 12,000 second-feet and extended above. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except those for low water, when operation of power plants causes diurnal fluctuation.

Discharge measurements of Merced River at Exchequer, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	J. F. Kunesh	6.08	112	July 24	J. F. Kunesh	6.12	242
23	do	5.90	50.9	25	do	5.65	144
June 19	Charles Leidl	10.99	2,990	Sept. 18	Charles Leidl	5.72	170
20	do	10.52	2,570	19	do	5.72	172

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Daily discharge, in second-feet, of Merced River at Exchequer, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	58	70	142	110	114	485	2,180	3,000	2,820	1,060	133	36
2	103	77	118	90	118	470	2,180	3,700	3,380	1,470	148	115
3	82	72	118	96	148	441	1,890	3,590	3,820	1,340	165	90
4	86	82	134	118	126	455	1,540	4,430	4,820	1,220	165	98
5	96	77	123	110	133	550	1,340	4,820	4,430	950	148	98
6	99	139	126	103	165	715	1,340	4,300	4,560	805	140	94
7	96	68	90	96	316	11,700	1,340	4,300	4,560	715	148	64
8	86	64	82	78	470	4,060	1,340	3,820	4,820	630	148	86
9	96	94	90	90	267	2,340	1,470	3,000	4,560	550	92	58
10	62	99	96	84	212	1,750	1,820	2,500	4,430	470	100	90
11	67	60	90	126	202	3,940	1,890	2,180	4,820	485	115	76
12	67	129	99	78	183	10,500	2,030	2,180	4,820	485	112	58
13	62	67	99	70	183	5,700	2,030	2,660	4,560	399	104	73
14	78	72	113	129	192	3,000	1,890	3,480	4,690	371	105	66
15	72	78	96	142	234	2,030	1,750	3,590	4,060	330	102	66
16	72	78	90	90	223	1,750	1,750	2,740	3,820	343	98	371
17	67	90	60	118	212	1,470	2,030	2,820	3,000	330	118	245
18	72	103	96	123	304	1,400	2,500	2,660	2,820	291	111	183
19	72	84	72	99	279	13,200	2,660	2,820	2,820	256	111	165
20	72	74	67	96	279	4,060	2,660	3,480	2,820	267	98	148
21	72	90	110	90	715	2,660	3,180	3,590	3,000	245	94	102
22	74	84	94	103	4,300	2,030	3,590	3,590	2,660	245	66	148
23	66	84	70	110	1,470	1,820	3,820	3,820	2,260	223	83	102
24	104	96	74	129	7,360	1,750	3,700	3,590	2,030	202	92	76
25	70	78	72	110	1,890	1,610	3,590	3,590	1,610	212	52	94
26	64	103	103	78	1,000	1,610	3,000	3,380	1,340	202	49	105
27	71	107	113	84	715	3,700	3,000	2,660	1,340	192	53	102
28	77	78	126	103	550	2,340	2,660	2,340	1,280	148	79	165
29	74	82	142	86	.....	1,960	3,000	2,030	1,220	174	54	118
30	78	94	134	78	.....	1,960	3,000	1,890	1,100	165	54	2,660
31	84	.....	99	82	.....	2,030	.....	2,260	.....	183	81	.....

Monthly discharge of Merced River at Exchequer, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 1,020 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	104	58	77.4	0.076	0.09	4,760
November	139	60	85.8	.084	.09	5,110
December	142	60	101	.099	.11	6,210
January	142	70	100	.098	.11	6,150
February	7,360	114	799	.783	.82	44,400
March	13,200	441	3,020	2.96	3.41	186,000
April	3,820	1,340	2,340	2.29	2.56	139,000
May	4,820	1,890	3,190	3.13	3.61	196,000
June	4,820	1,100	3,280	3.22	3.59	195,000
July	1,470	148	482	.473	.55	29,600
August	165	49	104	.102	.12	6,390
September	2,660	36	198	.194	.22	11,800
The year	13,200	36	1,150	1.13	15.28	830,000

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TENAYA CREEK NEAR YOSEMITE, CALIF.

LOCATION.—At Tenaya Bridge, in Yosemite National Park, five-eighths mile below outlet of Mirror Lake, five-eighths mile above junction with Merced River, and 1¾ miles east of Yosemite, Mariposa County.

DRAINAGE AREA.—47 square miles.

RECORDS AVAILABLE.—July, 1904, to June, 1909; January 5, 1912, to September 30, 1918 (incomplete).

GAGE.—Vertical staff fastened to left abutment of bridge near downstream end; read by an employee of Yosemite National Park. A Friez water-stage recorder was installed at same datum on left bank 50 feet above bridge September 15. Original staff gage fastened to upstream side of bridge 9 feet from left abutment; datum unknown. About December 1, 1912, a new staff gage was installed at new datum on upstream side of bridge near right abutment. This gage was removed and the present staff gage installed February 4, 1913. Present gage datum is 0.55 foot higher than previous datum.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.0 feet June 8 (discharge, 775 second-feet); minimum stage recorded, 0.98 foot September 20 and 21 (discharge, 1.6 second-feet).

1904–1909, 1912–1918: Maximum stage recorded, 8.1 feet.

June 16, 1906 (discharge, 1,280 second-feet); minimum stage recorded, 2.9 feet September 12 and most of October, 1906 (discharge, 0.5 second-foot). Relation between datum of gage of that date and the present datum unknown.

ICE.—Stage-discharge relation may be slightly affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent; not known to have been affected by ice during year. Rating curve well defined between 2 and 1,000 second-feet. Gage read to hundredths twice daily until December 20, twice a week until September 7, then once a day until September 14, when the water-stage recorder was installed. Daily discharge ascertained by applying mean daily gage height to rating table, except September 29, when hourly discharge was averaged; interpolated for days on which gage was not read. Records good.

COOPERATION.—Gage-height record furnished by W. B. Lewis, superintendent of Yosemite National Park.

Discharge measurements of Tenaya Creek near Yosemite, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 25	J. F. Kunesh	1.16	2.3	Aug. 29	Charles Leidl	1.11	1.9
Aug. 27	H. D. McGlashan	1.12	2.5	Sept. 15	do	1.00	1.9

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Daily discharge, in second-feet, of Tenaya Creek near Yosemite, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.5	1.7	2.6	4.2	2.5	20	78	450	315	68	5.5	1.8
2	3.0	1.7	2.5	3.8	2.5	22	78	497	368	58	5	1.8
3	2.7	1.7	2.5	3.5	2.5	22	76	543	420	49	4.7	1.8
4	2.5	1.7	2.3	3.1	2.5	22	73	590	435	43	3.8	1.8
5	2.2	1.7	2.3	2.7	2.5	22	70	548	450	37	3.0	1.8
6	2.2	2.2	2.2	2.6	2.5	22	68	505	558	31	2.2	1.8
7	2.2	2.2	2.2	2.6	2.5	26	77	462	667	28	2.2	1.8
8	2.2	2.2	2.2	2.6	2.5	30	86	420	775	25	2.2	1.8
9	2.2	2.2	2.2	2.5	2.5	34	96	339	729	22	2.0	1.8
10	2.2	2.2	2.2	2.5	4.1	36	105	257	682	20	1.9	1.8
11	2.2	2.2	2.3	2.5	5.5	38	110	176	636	19	1.8	1.7
12	2.2	2.2	2.3	2.5	7	39	116	193	590	18	1.8	1.7
13	2.2	2.2	2.3	2.5	9	41	121	211	543	17	1.7	1.7
14	2.2	2.2	2.4	2.5	9	41	135	228	497	14	1.7	1.7
15	2.2	2.2	2.5	2.5	9	41	148	246	450	11	1.7	1.7
15	2.2	2.2	2.7	2.5	9	41	162	264	390	11	1.7	1.7
17	2.2	2.2	2.7	2.5	9	42	176	282	330	10	1.7	1.7
18	2.2	2.2	2.7	2.5	8	43	208	300	288	9	1.7	1.6
19	2.2	2.2	2.7	2.5	8	44	240	308	246	8.5	1.7	1.6
20	2.2	2.2	2.7	2.5	8	45	272	315	226	8	1.7	1.6
21	2.2	2.2	2.7	2.5	9.5	48	259	322	207	7.5	1.7	1.6
22	1.7	2.2	2.7	2.5	11	51	247	330	187	7	1.8	1.6
23	1.7	2.2	2.7	2.5	13	54	234	345	154	6.5	1.8	1.7
24	1.7	2.2	2.7	2.5	14	58	244	360	121	6	1.8	1.7
25	1.7	2.2	4.6	2.5	15	61	253	375	100	5.5	1.8	1.7
26	1.7	2.2	6.5	2.5	16	64	262	343	78	5	1.8	1.7
27	1.7	2.2	6.1	2.5	17	68	272	310	68	4.7	1.9	1.7
28	1.7	2.2	5.7	2.5	19	70	316	278	59	5.5	1.8	1.7
29	1.7	2.2	5.4	2.5	.....	71	361	246	49	6	1.8	35
30	1.7	2.2	5.0	2.5	.....	73	406	269	58	6.5	1.8	27
31	1.7	.....	4.6	2.5	.....	78	.....	292	.....	6	1.8	.....

Monthly discharge of Tenaya Creek near Yosemite, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 47 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	3.5	1.7	2.13	0.045	0.05	131
November	2.2	1.7	2.12	.045	.05	126
December	6.5	2.2	3.14	.067	.08	193
January	4.2	2.5	2.66	.057	.07	164
February	19	2.5	7.95	.169	.18	442
March	78	20	44.1	.938	1.08	2,710
April	406	68	178	3.79	4.23	10,600
May	590	176	342	7.28	8.39	21,000
June	775	49	356	7.57	8.45	21,200
July	68	4.7	18.5	.394	.45	1,140
August	5.5	1.7	2.24	.048	.06	138
September	35	1.6	3.67	.078	.09	218
The year	775	1.6	80.2	1.71	23.18	58,000

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YOSEMITE CREEK AT YOSEMITE, CALIF.

LOCATION.—At highway bridge in Yosemite National Park, half a mile above junction with Merced River and one-fourth mile northwest of Yosemite, Mariposa County.

DRAINAGE AREA.—43.2 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 1904, to June 1909, and January 4, 1912, to September 30, 1918 (incomplete).

GAGE.—Staff in two sections; upper, vertical, fastened to left abutment near downstream end; lower, inclined, fastened to boulder in front of upper section; read by an employee of Yosemite National Park. Original staff gage was on tree on right bank 50 feet above bridge; January 4, 1912, new staff gage was installed on tree on right bank 25 feet above bridge at approximately same datum. Present gage was installed February 5, 1913, at datum, 3.04 feet higher than that of original gage.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Fine gravel and sand; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.0 feet at 9 a. m. April 13 (discharge, 979 second-feet); minimum stage recorded, 2.55 feet October 4 to November 5 (discharge, 0.1 second-foot).

1904–1909, 1912–1918: Maximum stage recorded, 10.0 feet at 7.50 p. m. June 8, 1917 (discharge not determined because of backwater); minimum stage, 2.50 feet at 9.15 a. m. September 9, 1915 (no flow).

ICE.—Stage-discharge relation slightly affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed April 13. Rating curves well defined below 6 second-feet, fairly well defined between 6 and 300 second-feet, and extended above. Gage read to half-tenths twice daily October 1 to December 20 and about twice a week the rest of the year. Daily discharge ascertained by applying mean daily gage height to rating table and interpolating for days on which gage was not read except September 12, 13, 15 and 30, for which discharge was estimated from flow of Merced River. Records fair.

COOPERATION.—Gage-height record furnished by W. B. Lewis, superintendent of Yosemite National Park.

Discharge measurements of Yosemite Creek at Yosemite, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 24	J. F. Kunesh	2.53	0.1
Aug. 27	H. D. McGlashan	2.60	.4
Sept. 16	Charles Leidl	2.69	2.8

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Daily discharge, in second-feet, of Yosemite Creek at Yosemite, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.5	0.1	0.6	0.8	0.5	9	109	280	280	92	1.8	0.6
2	.5	.1	.6	.6	.5	10	121	305	305	78	1.8	.6
3	.3	.1	.5	.4	.5	12	115	330	330	64	1.8	.6
4	.1	.1	.5	.2	.6	15	109	356	305	55	1.8	.6
5	.1	.1	.5	.2	.6	18	103	331	280	46	1.8	.6
6	.1	.1	.5	.2	.6	20	97	306	305	37	1.8	.6
7	.1	.3	.5	.2	.9	18	109	281	330	31	1.8	.6
8	.1	.5	.5	.2	1.3	15	121	256	356	24	1.8	.6
9	.1	.5	.5	.2	1.6	13	133	224	369	18	1.8	.5
10	.1	.5	.5	.2	1.8	14	145	192	382	18	1.8	.5
11	.1	.5	.5	.2	2.1	14	173	159	453	18	1.8	.5
12	.1	.5	.5	.2	2.3	17	201	189	524	16	1.8	.5
13	.1	.5	.5	.2	2.6	20	979	220	519	15	1.8	.5
14	.1	.5	.5	.3	2.6	22	606	250	514	13	1.8	19
15	.1	.5	.5	.4	2.6	25	234	280	509	12	1.8	30
16	.1	.5	.5	.5	2.6	27	206	288	459	10	1.7	2.8
17	.1	.5	.5	.5	2.8	28	177	297	409	8	1.6	2.5
18	.1	.5	.5	.5	2.9	30	183	305	357	7	1.5	2.2
19	.1	.5	.5	.5	3.0	31	189	305	305	7	1.4	1.8
20	.1	.5	.5	.5	3.2	32	195	305	250	7	1.3	1.2
21	.1	.5	.7	.5	3.6	35	195	305	195	6	1.3	.6
22	.1	.5	1.0	.5	4.0	38	195	305	141	6	1.3	.6
23	.1	.5	1.3	.5	4.4	41	195	301	116	5.5	1.2	.6
24	.1	.5	1.5	.5	5.0	44	195	296	92	5	1.1	.6
25	.1	.5	1.8	.5	5.5	46	208	292	78	5	1.0	.6
26	.1	.5	2.1	.5	6.0	49	221	259	64	4.6	.8	.6
27	.1	.5	1.8	.5	7.0	52	234	225	58	4.2	.6	.6
28	.1	.5	1.6	.5	8.0	65	246	192	52	3.8	.7	.6
29	.1	.5	1.4	.5	.....	77	258	159	47	3.4	.8	78
30	.1	.5	1.2	.5	.....	90	270	200	70	3.0	.8	80
31	.1	.....	1.0	.5	.....	97	.....	240	.....	2.4	.6	.....

Monthly discharge of Yosemite Creek at Yosemite, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 43.2 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	0.5	0.1	0.13	0.003	0.003	8.0
November	.5	.1	.41	.009	.01	24.4
December	2.1	.5	.83	.019	.02	51.0
January	.8	.2	.40	.009	.01	24.6
February	8.	.5	2.82	.065	.07	157
March	97	9	33	.764	.88	2,030
April	979	97	217	5.02	5.60	12,900
May	356	159	266	6.16	7.09	16,400
June	524	47	282	6.53	7.29	16,800
July	92	2.4	20.2	.468	.54	1,240
August	1.8	.6	1.44	.033	.04	88.5
September	80	.5	7.65	.175	.20	455
The year	979	.1	69.2	1.60	21.75	50,200

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SOUTH FORK OF MERCED RIVER AT WAWONA, CALIF.

LOCATION.—In SE. ¼ sec. 33, T. 4 S., R. 21 E., opposite United States military camp in Sierra National Forest, 1 mile below Wawona, Mariposa County. Big Creek enters half a mile above and Rush Creek three-fourths mile below the station.

DRAINAGE AREA.—131 square miles.

RECORDS AVAILABLE.—December 15, 1910, to June 30, 1916; April 13, 1917, to September 30, 1918.

GAGE.—Vertical staff fastened to alder tree on left bank; installed August 22, 1911, 250 feet below site of original gage, which was vertical staff fastened to center pier of footbridge destroyed by high water January 30, 1911. Original datum has not been maintained. Gage read by J. C. Bruce.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; appear permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year not known; record incomplete; minimum stage recorded, 2.05 feet September 21 (discharge, 12 second-feet).

1910–1918: Maximum stage recorded, 7.2 feet January 26 and February 19 and 20, 1914 (discharge, 3,770 second-feet); minimum stage recorded, 1.4 feet October 17 to November 8, 1915 (discharge, 0.2 second-foot).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—The ranch of the Wawona Co. is irrigated from a tributary above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined between 10 and 400 second-feet, well defined between 400 and 2,000 second-feet, and is extended above. Gage read to hundredths at irregular intervals. Daily discharge ascertained by applying gage height to rating table. Records good for low and medium and fair for high stages.

Discharge measurements of South Fork of Merced River near Wawona, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 29	J. F. Kunesh	2.08	13
Aug. 28	H. D. McGlashan	2.03	13

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Daily discharge, in second-feet, of South Fork of Merced River at Wawona, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	14	14	a 20	a 15	17	60	a 400	875	770	a 350	a 21	a 15
2	14	14	a 21	15	15	56	a 330	990	a 850	545	a 21	a 15
3	14	a 14	21	15	10	80	285	a 1,180	1,030	204	21	a 15
4	a 14	14	21	15	11	92	285	a 1,400	1,500	a 420	19	a 15
5	a 13	14	19	15	15	a 120	298	a 1,550	a 1,400	a 280	18	a 15
6	13	a 14	16	15	27	150	308	a 1,380	a 1,300	104	a 17	a 15
7	13	a 14	16	a 15	60	912	330	990	1,170	60	a 16	a 15
8	13	a 15	a 16	a 15	a 46	308	355	a 800	a 1,070	76	15	a 15
9	13	15	16	a 16	31	150	a 390	670	950	104	15	a 15
10	13	15	15	a 16	a 28	a 260	430	545	a 1,200	a 90	a 15	a 15
11	a 13	15	15	a 16	25	380	458	a 400	a 1,150	a 75	a 15	a 15
12	a 14	16	15	a 17	25	a 300	515	515	1,110	a 60	a 14	a 15
13	a 14	a 16	15	a 17	a 27	224	485	805	735	45	a 14	a 40
14	14	15	15	a 17	29	a 200	405	950	a 640	a 45	14	80
15	14	a 15	a 15	a 18	33	a 180	390	a 1,150	a 550	a 45	14	28
16	a 14	a 14	a 15	a 18	30	166	a 530	a 900	485	a 45	15	a 23
17	14	14	a 15	18	31	a 180	a 725	a 880	a 450	45	14	a 18
18	14	15	a 15	18	33	a 200	990	a 860	a 420	a 39	a 14	13
19	a 14	16	15	18	a 38	a 230	702	840	390	33	a 14	a 13
20	14	a 16	15	17	43	264	770	1,190	a 370	a 32	a 14	a 12
21	14	15	15	a 17	52	216	735	a 1,200	a 340	a 32	14	12
22	14	a 16	a 15	a 17	a 72	a 225	a 900	840	308	31	14	17
23	a 14	a 16	a 15	a 17	92	240	990	a 1,140	281	28	a 14	a 16
24	14	a 17	a 15	a 17	a 92	a 250	990	a 1,100	a 255	a 28	14	a 16
25	14	a 17	a 15	a 17	92	a 250	a 880	840	a 245	28	a 14	15
26	a 14	a 18	a 15	a 17	92	a 240	735	805	a 230	a 26	a 13	a 17
27	a 14	a 18	a 15	a 17	70	a 250	638	a 620	204	23	a 12	a 19
28	14	a 19	a 15	a 17	68	a 280	a 690	430	a 180	a 23	12	21
29	14	a 19	a 15	17	.....	a 310	740	a 370	121	a 22	a 13	735
30	14	a 20	a 15	17	.....	a 350	a 800	a 330	a 200	a 21	a 14	605
31	14	.....	a 15	17	.....	a 400	.....	605	.....	21	15	.....

a Gage not read; discharge estimated from record of flow of Merced River at Happy Isles and Exchequer.

NOTE.—Apr. 29, May 4, 7, and 19, recorded gage heights do not represent the mean for the day; discharge estimated from record of flow of Merced River at Exchequer.

Monthly discharge of South Fork of Merced River at Wawona, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 131 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	14	13	13.8	0.105	0.12	849
November	20	14	15.7	.120	.13	934
December	21	15	16.0	.122	.14	984
January	18	15	16.5	.126	.15	1,010
February	92	10	43.0	.328	.34	2,390
March	912	56	243	1.85	2.13	14,900
April	990	285	583	4.45	4.97	34,700
May	a 1,550	330	876	6.69	7.71	53,900
June	a 1,500	121	663	5.06	5.64	39,500
July	545	21	96.1	.734	.85	5,910
August	21	12	15.1	.115	.13	928
September	735	12	62.7	.479	.53	3,730
The year	a 1,550	10	221	1.69	22.84	160,000

a Estimated.

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TUOLUMNE RIVER AND TRIBUTARIES.

TUOLUMNE RIVER BELOW HETCH HETCHY DAM SITE, NEAR SEQUOIA, CALIF.

LOCATION.—In SW. ¼ SE. ¼ sec. 17, T. 1 N., R. 20 E., in Yosemite National Park, three-fourths mile below Hetch Hetchy dam site and 11 miles northeast of Sequoia, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 20, 1914, to September 30, 1918. This station was established to take the place of the station at the dam site when it became necessary to discontinue that station on account of construction.

GAGE.—Gurley printing water-stage recorder on left bank. Difference in elevation between the zero of this gage and that of the gage at the dam site is 53.15 feet.

DISCHARGE MEASUREMENTS.—Made from cable 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Boulders and solid rock; permanent. Bed at measuring section was smoothed off by removing some boulders. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 12.9 feet at 3 a. m. June 14 (discharge, 8,500 second-feet); minimum stage from water-stage recorder, 0.88 foot at 7 a. m. January 27 (discharge, 4.1 second-feet).

1915–1918: Maximum stage from water-stage recorder, 13.8 feet at 4 a. m. June 10, 1917 (discharge, 10,000 second-feet); minimum stage from water-stage recorder, 0.88 foot at 7 a. m. January 27, 1918 (discharge, 4.1 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during year. Rating curves well defined. Daily discharge ascertained by applying to rating table mean daily gage height determined by averaging readings printed every 15 minutes, except January 27, February 6, March 10, September 14 and 29, when mean hourly discharge was averaged. Records excellent.

Discharge measurements of Tuolumne River below Hetch Hetchy dam site, near Sequoia, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 17	1.36	22	June 12	11.88	6,420	July 11	4.65	412
Mar. 22	5.83	670	24	8.66	2,110	12	4.43	364
Apr. 12	7.24	1,240	July 1	7.20	1,210	22	3.38	200
28	8.26	1,790	5	6.54	960	Aug. 6	2.56	118
May 19	8.70	2,110	6	6.20	810	14	2.14	64
June 7	11.72	6,050	7	5.75	653	24	1.80	46

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Daily discharge, in second-feet, of Tuolumne River below Hetch Hetchy dam site, near Sequoia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	34	14	22	30	14	264	1,280	2,170	2,970	1,130	132	75
2	40	14	26	30	17	337	1,200	2,560	3,780	1,180	146	72
3	39	13	28	30	18	391	825	2,560	4,340	1,300	132	60
4	37	12	24	29	16	400	670	3,490	4,480	1,070	138	52
5	34	12	23	28	16	355	628	3,420	5,120	878	124	49
6	31	17	24	27	70	364	670	3,190	5,460	775	109	47
7	30	20	24	27	280	790	685	2,970	5,640	640	93	46
8	29	22	22	28	123	530	808	2,560	6,200	552	82	45
9	28	22	20	28	97	410	1,010	1,940	5,820	510	78	45
10	28	23	19	22	92	601	1,130	1,540	6,200	470	74	42
11	27	22	19	20	93	950	1,200	1,280	7,000	420	74	37
12	26	22	18	22	94	700	1,280	1,390	7,200	373	76	34
13	26	23	18	26	114	552	1,160	2,020	7,000	337	74	36
14	26	26	18	28	107	520	912	2,760	7,200	320	81	154
15	25	22	18	32	94	540	912	2,560	6,400	304	116	264
16	24	19	18	33	84	578	970	1,910	5,120	280	95	156
17	24	17	16	37	99	565	1,180	2,050	4,060	264	78	112
18	24	17	18	46	105	685	1,360	1,840	4,060	250	68	89
19	23	16	18	43	105	842	1,280	2,130	4,340	229	60	73
20	22	16	20	31	113	640	1,480	2,760	4,200	222	56	64
21	21	16	20	30	140	670	1,770	2,970	3,660	215	54	58
22	20	16	18	26	201	700	2,130	3,190	3,300	201	52	56
23	19	17	15	28	188	715	2,250	3,300	2,660	188	49	78
24	18	15	14	27	257	790	2,250	3,190	2,210	170	49	78
25	17	16	16	26	194	860	2,170	3,080	1,800	158	50	62
26	16	18	28	22	222	895	2,020	2,660	1,700	140	52	54
27	16	18	47	17	243	912	1,880	2,020	1,600	131	53	48
28	16	16	44	18	236	790	1,770	1,570	1,480	130	55	46
29	15	12	37	22	.....	808	1,980	1,300	1,300	130	56	1,100
30	14	14	34	20	.....	912	2,090	1,360	1,160	126	66	990
31	14	.....	32	16	.....	1,070	.....	1,980	.....	122	70	.....

Monthly discharge of Tuolumne River below Hetch Hetchy dam site, near Sequoia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	40	14	24.6	1,510
November	26	12	17.6	1,050
December	47	14	23.1	1,420
January	46	16	27.4	1,680
February	280	14	123	6,830
March	1,070	264	650	40,000
April	2,250	628	1,360	80,900
May	3,420	1,280	2,370	146,000
June	7,200	1,160	4,250	253,000
July	1,180	122	426	26,200
August	146	49	80.4	4,940
September	1,100	34	137	8,150
The year	7,200	12	789	572,000

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TUOLUMNE RIVER NEAR BUCK MEADOWS,[1] CALIF.

LOCATION.—In SW. ¼ sec. 24, T. 1 S., R. 17 E., 1 mile below junction with South Fork of Tuolumne River and 2 miles north of Buck Meadows, Mariposa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 2, 1907, to September 30, 1918 (not complete).

GAGE.—Gurley printing water-stage recorder on left bank, installed January 2, 1913. Prior to January 2, 1913, station was maintained by the Yosemite Power Co. in the pool above, the gage consisting of a vertical staff on the left bank at site of United States Geological Survey's present cable. The Survey began reading the gage November 17, 1913, and developed a curve of relation.

DISCHARGE MEASUREMENTS.—Made from cable one-third mile above gage.

CHANNEL AND CONTROL.—Boulders and solid rock; probably permanent. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 10.19 feet at 5 a. m. June 14 (discharge, 12,600 second-feet); minimum stage from water-stage recorder, 0.47 foot from 2 to 10 a. m. November 3 (discharge, 29 second-feet).

1907–1918: Maximum stage recorded, 14.00 feet January 14, 1909 (discharge, 27,200 second-feet); minimum stage recorded, 0.47 foot from 2 to 10 a. m. November 3, 1917 (discharge, 29 second-feet).

DIVERSIONS.—A small quantity of water is diverted from South Fork of Tuolumne River at Harden ranch, 7 miles above the mouth, and is used in vicinity of Groveland.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Mean daily height determined by averaging gage heights recorded every 15 minutes by the water-stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table, except December 1, 26, 27, February 6, September 14 and 29, when hourly discharge was averaged. Records excellent.

Discharge measurements of Tuolumne River near Buck Meadows, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 18	0.69	46	Feb. 25	3.26	603	May 30	5.86	2,570
Nov. 5	.48	30	Mar. 8	4.81	1,600	June 15	9.29	9,180
20	.60	38	27	6.00	2,770			
30	.57	34	Apr. 23	7.72	5,590			

[1] Formerly published as "near Groveland."

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Daily discharge, in second-feet, of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	50	30	61	110	73	645	3,270	5,010	5,190	1,460	158	107
2	50	30	208	105	77	735	3,480	5,550	6,570	1,710	182	111
3	53	30	147	100	72	835	2,520	5,550	7,250	1,840	188	106
4	55	30	110	95	74	920	2,040	6,570	7,990	1,580	163	91
5	52	30	91	90	72	930	1,840	7,010	8,580	1,270	165	82
6	49	39	83	86	190	1,120	1,890	6,570	8,810	1,050	149	75
7	46	40	82	86	1,050	3,340	1,940	6,350	9,110	890	134	74
8	44	42	72	94	580	1,840	2,140	5,750	9,410	760	121	74
9	42	52	65	107	450	1,270	2,580	4,490	9,110	668	113	73
10	40	48	65	91	417	1,420	3,270	3,480	9,410	622	108	66
11	39	45	65	78	396	3,480	3,340	2,870	10,400	560	102	61
12	38	44	62	81	384	3,410	3,550	2,990	10,700	499	104	60
13	38	46	59	97	405	2,240	3,340	3,930	10,400	457	106	63
14	37	57	57	109	414	1,760	2,930	5,370	10,700	432	108	423
15	37	58	51	132	370	1,660	3,040	5,370	9,410	408	116	454
16	37	52	49	129	337	1,620	3,160	4,010	7,990	382	144	296
17	38	45	50	144	382	1,620	3,270	4,250	6,350	359	126	200
18	44	41	50	156	376	1,990	3,620	3,850	6,150	334	110	151
19	39	39	48	169	368	3,850	3,550	4,250	6,350	313	99	121
20	37	38	50	142	379	2,360	3,850	5,190	6,150	294	90	114
21	37	37	54	111	506	2,080	4,330	5,550	5,370	286	84	107
22	35	37	56	106	982	2,040	5,190	5,750	4,830	267	81	116
23	34	36	53	99	785	1,990	5,370	6,150	4,250	251	80	167
24	33	36	52	99	1,380	2,140	5,370	5,950	3,480	236	76	138
25	33	36	52	97	690	2,360	5,190	5,750	2,750	218	75	130
26	32	36	98	94	690	2,630	4,650	5,010	2,360	200	75	117
27	32	37	384	84	690	3,130	4,650	4,010	2,190	182	77	102
28	31	37	216	80	668	2,410	4,250	3,130	2,040	172	78	103
29	31	37	150	83	.....	2,300	4,650	2,630	1,800	169	80	754
30	31	36	140	89	.....	2,460	4,830	2,750	1,540	165	88	1,540
31	31	.....	120	77	.....	2,870	.....	3,770	.....	160	100	.....

NOTE.—No gage-height record Dec. 29 to Jan. 5; discharge estimated from flow at other stations in the drainage basin; Apr. 15 and 16, discharge interpolated.

Monthly discharge of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	55	31	39.5	2,430
November	58	30	40.0	2,380
December	384	48	93.5	5,750
January	169	77	104	6,390
February	1,380	72	473	26,300
March	3,850	645	2,050	126,000
April	5,370	1,840	3,570	212,000
May	7,010	2,630	4,800	295,000
June	10,700	1,540	6,550	390,000
July	1,840	160	587	36,100
August	188	75	112	6,890
September	1,540	60	203	12,100
The year	10,700	30	1,550	1,120,000

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TUOLUMNE RIVER ABOVE LA GRANGE DAM, NEAR LA GRANGE, CALIF.

LOCATION.—In NE. ¼ sec. 3, T. 3 S., R. 14 E., 3½ miles above La Grange dam and 5 miles above La Grange, Stanislaus County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 19, 1915, to September 30, 1918.

GAGE.—Gurley printing water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made from cable 80 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed consists of solid rock and boulders. Banks are high, one channel at all stages. Control is solid rock dike which extends entirely across the stream and over which at low water there is a drop of about 5 feet. Point of zero flow, gage height 0.06 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 22.47 feet at 6.30 p. m. March 7 (discharge, determined from extension of rating curve, 23,300 second-feet); minimum stage recorded, 1.06 feet from noon October 30 to 3 a. m., October 31, and 11 a. m. November 4 to 4 p. m. November 5 (discharge, 5 second-feet).

1916–1918: Maximum stage recorded, 27.58 feet at 5.15 p. m. February 21, 1917 (discharge, 36,500 second-feet); minimum stage recorded October 30, 31, November 4 and 5, 1917.

DIVERSIONS.—Sierra and San Francisco Power Co.'s canal heads 9½ miles above and returns its water about one-half mile above the bridge at La Grange. There is also a small diversion from South Fork of Tuolumne River at Harden ranch for irrigation in vicinity of Groveland.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. Mean daily gage height determined by averaging gage heights printed every 15 minutes by the water-stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table, except March 7, 8, September 15 and 30, when hourly discharge was averaged. Records excellent.

Discharge measurements of Tuolumne River above La Grange dam, near La Grange, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 9	Charles Leidl	1.41	14	July 29	J. F. Kunesh	2.81	136
31	C. J. Emerson	1.09	6.9	Aug. 29	Charles Leidl	2.16	62

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Daily discharge, in second-feet, of Tuolumne River above La Grange dam, near La Grange, Calif., for the year ending Sept. 30. 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	7	45	156	91	912	4,550	5,980	5,300	1,380	132	42
2	22	7	192	142	81	972	4,910	6,680	6,820	1,600	127	57
3	21	6	298	164	86	1,060	4,000	6,680	7,710	1,780	163	61
4	21	5	204	145	83	1,120	3,240	7,410	8,310	1,720	150	60
5	22	5.5	152	122	81	1,190	2,790	8,310	8,910	1,330	131	46
6	21	13	129	115	103	1,240	2,700	7,860	9,210	1,100	131	53
7	19	42	114	110	678	13,700	2,700	7,710	9,510	972	113	29
8	16	46	108	107	1,040	5,880	2,970	6,820	9,810	816	100	29
9	15	48	97	112	631	2,790	3,330	6,120	9,660	710	106	28
10	24	39	88	125	530	2,280	4,440	4,550	9,510	646	75	31
11	22	42	84	109	478	5,040	4,550	3,700	10,300	572	65	38
12	10	72	84	100	465	15,100	4,790	3,420	10,900	517	61	23
13	8.5	95	80	132	452	7,710	4,670	4,440	10,700	465	62	34
14	7.5	109	74	152	504	4,000	3,900	5,840	10,900	428	86	60
15	7	92	68	238	544	3,060	3,510	6,260	9,960	404	63	502
16	6.5	82	66	185	440	2,700	3,510	4,910	8,760	404	72	428
17	7	60	64	166	530	2,520	3,900	4,790	7,260	349	113	278
18	9	48	64	179	678	2,520	4,670	4,550	6,680	328	97	184
19	12	43	68	188	517	11,200	4,790	4,670	6,820	308	78	134
20	16	38	61	196	504	5,980	4,910	5,560	6,540	288	64	102
21	14	36	56	164	727	4,000	5,430	6,260	5,980	269	72	89
22	12	34	58	139	3,900	3,510	6,260	6,540	5,170	255	42	83
23	10	31	61	131	1,720	3,240	6,820	6,820	4,550	235	38	90
24	9	30	61	122	5,560	3,240	6,820	6,680	3,700	222	34	148
25	8.5	28	62	121	2,060	3,330	6,540	6,540	2,970	204	32	134
26	7	28	74	118	1,190	3,510	5,980	5,840	2,440	195	27	112
27	6	30	231	113	1,080	5,700	5,980	4,670	2,200	174	25	96
28	6	30	338	98	972	4,110	5,430	3,700	2,060	156	25	96
29	5.5	31	255	91	.....	3,600	5,560	3,060	1,780	145	26	98
30	5	31	204	114	.....	3,600	5,840	3,060	1,600	163	26	1,380
31	6	.....	177	104	.....	4,000	.....	3,800	.....	135	31	.....

Monthly discharge of Tuolumne River above La Grange dam, near La Grange, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	24	5	12.9	793
November	109	5	40.3	2,400
December	338	45	120	7,380
January	238	91	137	8,420
February	5,560	81	919	51,000
March	13,700	912	4,280	263,000
April	6,820	2,700	4,650	277,000
May	8,310	3,060	5,590	344,000
June	10,900	1,600	6,870	409,000
July	1,780	135	589	36,200
August	163	25	76.4	4,690
September	1,380	23	152	9,040
The year	13,700	5	1,950	1,410,000

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Combined daily discharge, in second-feet, of Tuolumne River above La Grange dam near La Grange, Calif., and Sierra & San Francisco Power Co.'s canal, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	85	68	109	217	152	976	4,610	6,040	5,370	1,450	196	106
2	83	68	253	203	145	1,040	4,970	6,740	6,890	1,670	191	121
3	82	67	359	225	150	1,120	4,060	6,740	7,780	1,850	227	125
4	82	66	265	206	147	1,180	3,300	7,470	8,350	1,790	214	124
5	83	66	213	183	145	1,250	2,850	8,370	8,980	1,400	195	110
6	82	74	190	176	167	1,300	2,760	7,920	9,280	1,170	195	111
7	80	103	175	171	742	13,700	2,760	7,720	9,580	1,040	171	98
8	77	107	169	168	1,100	5,900	3,030	6,860	9,870	884	164	93
9	76	109	158	173	695	2,850	3,390	6,190	9,730	774	170	92
10	79	100	149	186	594	2,340	4,480	4,610	9,580	714	139	95
11	73	103	145	170	542	5,100	4,610	3,770	10,400	640	129	102
12	71	133	145	161	529	15,200	4,850	3,490	11,000	581	125	87
13	70	136	141	193	516	7,760	4,730	4,510	10,800	529	126	98
14	68	170	135	213	568	4,060	3,960	5,880	11,000	492	128	124
15	68	153	129	299	608	3,120	3,570	6,300	10,000	468	127	566
16	68	143	127	246	504	2,760	3,570	4,980	8,830	468	136	492
17	68	121	125	227	594	2,560	3,960	4,860	7,330	413	177	321
18	70	109	125	240	742	2,580	4,730	4,590	6,750	392	161	248
19	73	84	129	249	581	11,200	4,850	4,740	6,890	372	142	198
20	77	99	122	257	568	6,040	4,970	5,630	6,610	352	128	166
21	75	97	117	225	791	4,060	5,490	6,330	6,050	333	115	153
22	73	95	119	200	3,960	3,570	6,300	6,580	5,240	319	108	147
23	71	92	122	192	1,780	3,300	6,880	6,860	4,620	299	102	154
24	70	91	122	183	5,620	3,300	6,880	6,750	3,770	286	98	212
25	70	69	123	182	1,120	3,390	6,600	6,610	3,040	268	96	177
26	48	89	135	179	1,250	3,570	6,040	5,910	2,510	259	91	176
27	67	91	292	174	1,140	5,760	6,040	4,740	2,270	238	89	160
28	67	91	399	159	1,040	4,170	5,490	3,740	2,130	220	89	160
29	66	92	316	152	.....	3,660	5,620	3,130	1,850	209	90	162
30	66	92	265	175	.....	3,660	5,900	3,130	1,670	227	90	1,440
31	67	.....	238	165	.....	4,060	.....	3,870	.....	199	95	.....

Combined monthly discharge of Tuolumne River, above La Grange dam near La Grange, Calif., and Sierra & San Francisco Power Co.'s canal, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	85	48	72.7	4,470
November	170	66	99.3	5,910
December	399	109	181	11,100
January	257	152	198	12,200
February	5,620	145	982	54,500
March	15,200	976	4,340	267,000
April	6,880	2,760	4,710	280,000
May	8,370	3,130	5,650	347,000
June	11,000	1,670	6,940	413,000
July	1,850	199	655	40,300
August	227	89	139	8,550
September	1,440	87	214	12,700
The year	15,200	48	2,010	1,460,000

NOTE.—See page 156 for record of flow of Sierra & San Francisco Power Co.'s canal.

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FALLS CREEK NEAR SEQUOIA, CALIF.

LOCATION.—In NE. ¼ sec. 3, T. 1 N., R. 20 E., in Yosemite National Park, 300 feet above branch to Tueenlala Falls, one-fourth mile above Wapama Falls, and 13 miles northeast of Sequoia, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 22, 1915, to September 30, 1918.

GAGE.—Stevens water-stage recorder on right bank.

DISCHARGE MEASUREMENTS.—Made from cable 400 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed consists of broken boulders; rough; straight above and below station. Banks not subject to overflow. Control is ledge of rock 75 feet below gage. Point of zero flow, gage-height 0.4 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.34 feet at 9 a. m. June 14 (discharge, 1,070 second-feet); minimum stage, from water-stage recorder, 0.71 foot November 4 and 5 (discharge 0.5 second-foot).

1916–1918: Maximum stage, from water-stage recorder, 5.6 feet at 8 a. m. June 10, 1917 (discharge, 1,200 second-feet); minimum stage, from water-stage recorder 0.71 foot November 4 and 5, 1917 (discharge, 0.5 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined above 10 second-feet, and fairly well defined below. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph, except December 1, February 6, March 10, and September 29, when hourly discharge was averaged. Records excellent except those for extreme low water, which are considered good.

Discharge measurements of Falls Creek near Sequoia, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 2	1.00	1.2	Apr. 27	3.61	375
Apr. 13	3.11	214	Aug. 20	1.15	2.3

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Daily discharge, in second-feet, of Falls Creek near Sequoia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.6	0.6	3.0	5.0	3.0	49	224	420	565	115	9.0	3.5
2	1.6	.6	6.5	5.0	2.7	59	193	457	660	138	8.0	3.1
3	1.6	.6	4.8	4.8	2.6	68	148	443	690	157	8.0	2.9
4	1.6	.5	4.5	4.7	2.6	67	119	530	715	123	7.0	2.6
5	1.5	.5	4.6	4.4	2.7	57	114	587	745	88	6.5	2.4
6	1.4	.6	4.2	4.1	71	52	123	530	770	74	6.5	2.2
7	1.4	.8	3.7	4.1	71	97	138	530	766	63	5.5	2.1
8	1.2	1.0	3.2	4.7	38	63	162	450	810	52	4.8	2.0
9	1.2	.8	2.9	4.7	31	55	206	315	788	45	4.2	1.9
10	1.1	.8	2.6	4.8	29	98	236	230	788	39	4.0	1.9
11	1.1	.9	2.6	2.5	31	134	241	183	854	35	3.8	2.0
12	1.0	1.2	2.4	3.2	33	78	250	188	854	32	3.6	2.0
13	1.0	1.9	2.3	4.8	35	64	222	286	877	29	3.7	2.5
14	1.0	1.5	2.2	7	31	64	173	416	924	27	3.6	12
15	1.0	1.4	2.1	7	31	72	171	416	788	25	3.5	23
16	1.0	1.5	2.0	8	29	82	193	286	704	23	3.3	19
17	1.0	1.5	2.0	11	33	82	238	300	568	22	3.3	13
18	1.0	1.4	2.0	12	32	93	266	266	530	21	3.2	9.5
19	.9	1.4	2.0	10	32	83	261	309	457	20	3.0	7.5
20	.9	1.4	2.0	8	34	74	289	404	426	19	2.7	6
21	.9	1.4	2.0	5.5	33	95	336	446	362	18	2.6	5.5
22	.8	1.2	2.2	5	36	108	388	494	330	17	2.4	5
23	.8	1.2	2.2	4.2	34	121	413	512	315	16	2.2	5
24	.7	1.2	2.2	3.9	38	138	416	477	258	15	2.1	5
25	.7	1.2	2.5	3.9	38	153	400	460	206	14	1.9	4.6
26	.7	1.2	15	4.0	41	142	388	420	180	13	1.8	4.1
27	.7	1.2	14	3.7	47	123	378	315	173	12	1.7	3.7
28	.6	1.2	9.5	3.5	45	114	352	235	153	11	1.7	3.7
29	.6	1.2	8	3.2	.....	134	372	231	129	11	1.7	38
30	.6	1.2	7	3.1	.....	162	400	315	110	10	2.5	108
31	.6	.....	6	3.2	.....	190	.....	460	.....	10	3.5	.....

NOTE.—No gage-height record May 28 to June 6 and July 12 to Aug. 5; discharge estimated from flow of Cherry Creek and Tuolumne River below Hetch Hetchy dam site.

Monthly discharge of Falls Creek near Sequoia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1.6	0.6	1.03	63.3
November	1.9	.5	1.10	65.5
December	15	2.0	4.26	262
January	12	2.5	5.26	323
February	71	2.6	31.7	1,760
March	190	49	95.8	5,890
April	416	114	260	15,500
May	587	183	384	23,600
June	924	110	550	32,700
July	157	10	41.7	2,560
August	9	1.7	3.91	240
September	108	1.9	10.1	601
The year	924	.5	143	83,600

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CHERRY CREEK NEAR SEQUOIA, CALIF.

LOCATION.—In SW. ¼ sec. 28, T. 2 N., R. 19 E., in Stanislaus National Forest, at abandoned sawmill camp 3 miles by trail from Lake Eleanor and 13 miles north of Sequoia, Tuolumne County.

DRAINAGE AREA.—114 square miles [1] (above dam site in sec. 5, T. 1 N., R. 19 E.).

RECORDS AVAILABLE.—April 1, 1910, to September 30, 1918.

GAGE.—Gurley printing water-stage recorder on right bank 800 feet above site of old suspension bridge. Original gage was a Lietz graph water-stage recorder at the bridge. It was moved upstream to present site (new datum) October 22, 1913; and replaced by the present gage (same datum) November 30, 1914.

DISCHARGE MEASUREMENTS.—Made from cable 800 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed consists of fine gravel and sand which shifts slightly. Control is a solid rock dike except at right bank, where it is gravel and small boulders. Channel is straight above and curved to right below. Left bank is high; right bank fairly high and probably not subject to overflow. Zero flow, gage height, 0.4 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 7.20 feet at 11 p. m. June 13 (discharge determined from extension of rating curve, 2,740 second-feet); minimum stage from water-stage recorder, 0.72 foot from 4 a. m. November 2 to 10 p. m. November 10 (discharge, 0.5 second-foot).

1910–1918: Maximum mean daily discharge, 7,000 second-feet January 31, 1911 (maximum stage unknown); minimum stage, dry September 6 to 12, 1910.

ICE.—Stream freezes over at gage but not at control. Stage-discharge relation probably not affected by ice.

DIVERSIONS.—None.

REGULATION.—None before June 22. Complete regulation by Eleanor dam after June 22.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 10 and 3,000 second-feet. Operation of water-stage recorder satisfactory throughout the year except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height, determined by averaging the readings printed every 15 minutes by the water-stage recorder, except November 6, 7, 12, December 1, 25, 26, 27, February 6, March 10, September 13, 14, 22, and 28–30, when hourly discharge was averaged. Records excellent, except those for extreme low water, which are considered good.

Discharge measurements of Cherry Creek near Sequoia, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 11	0.94	1.9	Apr. 15	3.33	490	June 20	4.40	913
Jan. 1	1.58	32	May 18	4.06	756	July 20	1.58	32
Apr. 5	2.88	308	June 5	5.53	1,540	Aug. 20	.88	1.3

[1] Freeman, J. R., The Hetch Hetchy water supply for San Francisco, p. 24, 1912.

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Daily discharge, in second-feet, of Cherry Creek near Sequoia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.
1	0.9	0.5	33	29	13	158	692	1,300	1,330	245	12	3.9
2	.9	.5	53	26	13	191	612	1,430	1,560	373	10	2.2
3	.9	.5	44	24	12	210	444	1,400	1,620	451	9.0	1.7
4	.8	.5	35	21	12	207	384	1,650	1,680	312	8.0	1.5
5	.8	.5	32	19	12	158	373	1,830	1,750	223	6.5	1.2
6	.8	4.0	30	20	375	156	387	1,660	1,820	170	6.0	1.0
7	.8	18	23	26	344	340	440	1,660	1,820	136	5.5	1.0
8	.7	6	18	39	122	173	493	1,400	1,960	114	4.7	1.0
9	.7	3.3	20	25	114	153	672	985	1,820	94	4.2	.9
10	.7	2.6	20	16	114	333	712	720	1,820	85	3.7	.8
11	.7	2.3	17	14	110	528	712	570	2,020	75	3.3	.8
12	.6	9.5	14	18	110	316	755	585	2,100	67	2.9	.8
13	.6	21	11	27	117	229	652	895	2,100	60	2.6	25
14	.6	8.5	9.5	50	94	207	536	1,300	2,100	55	2.3	496
15	.6	4.7	10	47	85	232	572	1,300	1,620	49	2.2	67
16	.5	3.3	8.0	55	84	255	605	900	1,500	45	2.0	29
17	.5	2.4	7.0	67	84	255	745	940	1,250	42	1.9	19
18	.5	2.2	8.5	72	87	391	830	845	1,120	37	1.8	14
19	.5	1.9	13	51	84	299	815	1,020	1,000	34	1.7	12
20	.5	1.8	14	30	78	248	905	1,150	958	31	1.7	10
21	.5	1.7	14	26	85	289	1,050	1,200	778	28	1.6	8.5
22	.5	1.6	12	22	96	312	1,210	1,280	734	26	1.5	88
23	.5	1.6	9.0	23	94	330	1,290	1,300	712	24	1.4	34
24	.5	1.6	7.0	22	92	387	1,300	1,220	592	22	1.3	22
25	.5	1.5	9.0	24	102	432	1,250	1,150	482	20	1.2	17
26	.5	1.4	277	20	129	447	1,200	958	421	19	1.0	14
27	.5	1.4	162	17	147	362	1,200	734	394	18	1.0	10
28	.6	1.3	85	17	144	337	1,100	552	337	16	.9	29
29	.7	1.1	62	16	.....	406	1,160	544	282	15	.9	387
30	.7	1.1	44	16	.....	493	1,250	734	242	14	1.0	198
31	.8	.....	33	14	.....	592	.....	1,080	.....	12	12	.....

NOTE.—No gage-height record Oct. 4–15, and Apr. 16 to May 17; discharge estimated from flow of Falls Creek and Tuolumne River.

Monthly discharge of Cherry Creek near Sequoia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0.9	0.5	0.64	39.4
November	21	.5	3.61	215
December	277	7	36.6	2,250
January	72	14	28.8	1,770
February	375	12	105	5,830
March	592	153	304	18,700
April	1,300	373	812	48,300
May	1,830	544	1,110	68,300
June	2,100	242	1,260	75,000
July	451	12	93.9	5,770
August	12	.9	3.74	230
September	496	.8	49.9	2,970
The year	2,100	.5	317	229,000

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ELEANOR CREEK NEAR SEQUOIA, CALIF.

LOCATION.—In SW. ¼ sec. 3, T. 1 N., R. 19 E., in Yosemite National Park, one-third mile below Lake Eleanor dam site, 1½ miles below Lake Eleanor, and 11 miles north of Sequoia, Tuolumne County.

DRAINAGE AREA.—79 square miles[1] (above dam site in sec. 3, T. 1 N., R. 19 E.).

RECORDS AVAILABLE.—November 20, 1909, to September 30, 1918.

GAGE.—Lietz water-stage recorder in wooden house on reinforced concrete well on right bank. Previous to November 13, 1915, recorder was one mile upstream on right bank. Short distance upstream from that site was a vertical staff in two sections which was probably the original gage.

DISCHARGE MEASUREMENTS.—Made from cable 75 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed consists of small boulders. Control of large boulders, ledge, and concrete wall for low water. Channel straight above and below. Banks not subject to overflow. Zero flow, gage height 0.9 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.23 feet at 8 a. m. May 5 (discharge, 952 second-feet); minimum stage, from water-stage recorder, 1.00 foot September 15–18 (discharge, 0.1 second-foot).

1910–1918: Maximum stage recorded, 13.1 feet January 30, 1911 (discharge, 5,000 second-feet); minimum stage, dry September 8 to 14, 1910.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory throughout the year. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph, except February 6, August 2, September 8, 9, 14, 20–24, and 29, when discharge for two-hour periods was averaged. Records excellent.

Discharge measurements of Eleanor Creek near Sequoia, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 9	1.05	0.2	Apr. 14	4.43	564
Apr. 4	4.00	397	June 22	3.65	277

[1] Freeman, J. R., The Hetch Hetchy water supply for San Francisco, p. 24, 1912.

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Daily discharge, in second-feet, of Eleanor Creek near Sequoia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.4	0.1	0.1	20	16	120	585	770	370	0.5	12	18
2	.4	.1	.1	20	15	125	630	795	458	.3	11	18
3	.3	.1	.2	20	15	136	505	770	517	.2	6.0	18
4	.3	.1	1.2	18	14	150	412	845	553	.2	6.0	18
5	.2	.1	1.2	18	14	158	348	925	581	.2	3.5	18
6	.2	.2	1.2	18	24	163	339	845	585	.2	6.0	18
7	.2	.2	2.1	16	131	221	351	820	608	.2	9.0	18
8	.2	.2	2.1	16	165	244	392	770	608	.2	7.5	12
9	.2	.2	2.1	16	158	207	465	698	608	.2	4.7	11
10	.2	.2	2.1	14	147	196	652	545	585	.2	9.5	10
11	.2	.1	2.3	14	134	364	675	440	608	.2	11	12
12	.2	.1	2.5	14	126	423	698	402	630	.2	11	12
13	.2	.1	2.5	15	123	360	675	458	630	.2	11	11
14	.2	.1	2.7	16	120	300	553	561	630	.2	11	4.3
15	.2	.1	2.7	16	113	267	497	608	581	.2	11	.1
16	.2	.1	2.5	16	105	252	497	521	509	.2	12	.1
17	.2	.1	2.5	17	105	249	565	473	477	.2	13	.1
18	.2	.1	2.5	18	102	276	652	465	423	.2	13	5.5
19	.2	.1	2.5	19	97	351	698	465	381	.2	13	9.5
20	.2	.1	2.5	20	96	324	720	513	354	.2	13	16
21	.2	.1	2.1	21	101	306	770	541	327	.2	13	19
22	.2	.1	2.5	22	111	309	845	561	285	.2	14	7.5
23	.1	.1	2.5	21	115	315	925	581	158	.2	15	2.4
24	.1	.1	2.7	21	131	339	870	573	64	.2	15	13
25	.1	.1	3.3	20	128	381	820	549	59	.2	15	19
26	.1	.1	6.0	20	123	430	745	521	3.1	.2	15	22
27	.1	.1	11	18	123	454	770	454	2.1	.2	15	23
28	.1	.1	16	18	120	402	698	388	1.2	.2	15	34
29	.1	.1	19	18	.....	378	698	324	.8	.2	19	18
30	.1	.1	20	17	.....	423	745	294	.6	.2	18	.4
31	.1	.....	20	16	.....	493	.....	309	.....	.2	18	.....

Monthly discharge of Eleanor Creek near Sequoia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0.4	0.1	0.19	11.7
November	.2	.1	.12	7.1
December	20	.1	4.60	283
January	22	14	17.8	1,090
February	165	14	99.0	5,500
March	493	120	294	18,100
April	925	339	626	37,200
May	925	294	574	35,300
June	630	.6	387	23,000
July	.5	.2	.21	12.9
August	19	3.5	11.8	726
September	34	.1	12.9	768
The year	925	.1	169	122,000

EVAPORATION FROM LAKE ELEANOR NEAR SEQUOIA, CALIF.

LOCATION.—In sec. 35, T. 2 N., R. 19 E., in Yosemite National Park, about 12 miles north of Sequoia, Tuolumne County.

RECORDS AVAILABLE.—February 27, 1915, to September 30, 1918.

EQUIPMENT.—Evaporation pan is 48 inches in diameter, 10 inches deep, hung by four turnbuckles in a raft of cedar logs. Raft is anchored about 1,000 feet from the nearest shore. A temporary pan was used from March 19 to July 3.

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METHOD.—Observations made several times a week by an engineer who measures the quantity of water he adds to or takes out of the pan in order to bring the water surface in the pan to the point of a metal cone set at its center. The water added or taken out is measured in a small can, the cubical content of which is known. Number of cans is reduced to depth in inches and that, corrected by the amount of precipitation, gives amount of evaporation.

ELEVATION.—About 4,700 feet above sea level.

Total evaporation, in inches, since last day recorded, of Lake Eleanor near Sequoia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	(a)							0.6			0.5	
2	0.26	0.38		0.12	0.14		0.2		0.6		.5	0.5
3			0.01					.5		[b]1.2		
4				.12	.10		.3		.6		.5	.6
5	.56	.05	.20		.06			.6	.3			
6				.08			.3				.5	.5
7			.28		(a)			.6				
8	.62	.34		.08			.4			1.3	.7	.8
9			.20		.14		.2	.0				
10	.38	.28					.0			.7	.5	.5
11		[b].14	.18		.14			(a)	1.6			
12	.42			[b].40			.2			.7	.5	.5
13		.32	.18					.4				
14	.40			.11						.5	.5	(a)
15		.28	.14	.08	.22		.2	.5				
16	.36									.8		.5
17		[b].28	[b].17	.10			.3	.4			1.1	
18	.36								1.6	.7		.4
19		.26	.20	.10		(a)	(a)	.4			.6	
20	.36									.6		.3
21		.22	.10	.08		.1	.3	.4			.6	
22	.36								.9	.5		.5
23		.24	.12	.10		.3	.3	.5			.6	
24	.36									.6		.4
25		.24	.08	.12		.2	.2	.5			.6	
26	.36								1.2	.6		.4
27		.20	.10	.20		(a)	.4	.4			[b].8	
28	.36									.7		.2
29		.22	.08	.12		.2	.6	.6	1.0		[b].8	.0
30	.38									.4		
31			.10	.14		.3		.4		.4	.6	
Total for month	5.54	3.45	2.14	1.95	.80	1.1	3.9	6.8	7.8	9.7	9.9	6.2

[a] Record started. [b] Estimated.

NOTE.—Breaks in record Feb. 6, 16–27, Mar. 26, Apr. 18, May 10, Sept. 13, and 30, due to storms. Pan was sunk by storm Feb. 27; no record Feb. 27 to Mar. 18.

SOUTH FORK OF TUOLUMNE RIVER NEAR SEQUOIA, CALIF.

LOCATION.—In NW. ¼ sec. 31, T. 1 S., R. 19 E., at highway bridge at Harden ranch, 600 feet above Hazel Green Creek, 1 mile above intake of Golden Rock ditch, and 3 miles west of Sequoia, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 11, 1914, to February 23, 1918, when station was discontinued.

GAGE.—Vertical staff fastened to downstream end of right abutment of bridge; read by employees of Yosemite Power Co.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; shifts during high water. Banks are high but right bank may be overflowed at extreme high water.

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EXTREMES OF DISCHARGE.—1914–1918: Maximum stage recorded, 8.0 feet at 7 a. m. and 5 p. m. January 25, 1914 (discharge, determined from extension of rating curve, about 3,510 second-feet); minimum stage recorded, 0.9 foot January 11, 1918 (discharge, 0.5 second-foot).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined between 7 and 500 second-feet and extended above. Gage read to half-tenths twice daily from October 1, to November 10, once daily November 11, to January 2, and twice a week after January 2. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by Yosemite Power Co.

Discharge measurements of South Fork of Tuolumne River near Sequoia, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Nov. 16	1.41	11
Mar. 13	2.80	208
Aug. 10	1.40	10

Daily discharge, in second-feet, of South Fork of Tuolumne River near Sequoia, Calif., for the period Oct. 1, 1917 to Feb. 23, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.
1	9	7.5	42	10	a4.5	16	7.5	10	14	a1.8	17
2	9	7.5	42	14	7	17	9	10	14	2.0	24
3	9	7.5	33	a12	a9	18	9	10	14	a1.8	33
4	9	7.5	28	9	a11	19	10	10	14	1.5	24
5	9	9	20	a8	a13	20	10	10	14	a1.8	33
6	9	17	14	a6.5	a16	21	10	10	14	2.0	147
7	9	14	14	5.5	a18	22	10	10	14	a1.45	66
8	9	10	10	a5.0	a20	23	10	10	10	7	94
9	9	10	10	4.0	a22	24	10	10	10	a6	.....
10	7.5	10	10	a2.2	24	25	10	10	10	a5.0	.....
11	7	10	10	.5	17	26	9	10	14	4.0	.....
12	7	17	10	a.8	17	27	9	10	14	a4.0	.....
13	7	14	14	a1.2	66	28	7.5	10	10	4.0	.....
14	7	14	14	1.5	42	29	7.5	10	10	a3.3	.....
15	7	10	14	a1.7	17	30	7.5	10	10	a2.7	.....
						31	7.5	.....	10	2.0	.....

a Gage not read; discharge interpolated.

Monthly discharge of South Fork of Tuolumne River near Sequoia, Calif., for the period Oct. 1, 1917 to Feb. 23, 1918.

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	10	7	8.61	529
November	17	7.5	10.5	625
December	42	10	15.5	953
January	14	.5	4.36	268
February 1–23	147	4.5	32.2	1,470
The period	.....	.....	.....	3,840

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SOUTH FORK OF TUOLUMNE RIVER NEAR BUCK MEADOWS, CALIF.

LOCATION.—At South Fork trail bridge, in Stanislaus National Forest, one-fourth mile above junction with Tuolumne River and 2 miles northeast of Buck Meadows, Mariposa County. Middle Fork enters 2½ miles above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 13, 1910, to September 30, 1918 (very fragmentary up to September 30, 1916).

GAGE.—Stevens continuous water-stage recorder on right bank about 600 feet above trail bridge, at same location and datum as inclined staff gage installed May 19, 1914. Previous to this date gage was a vertical staff on middle pier of bridge at downstream end and at the same datum as present gage. Present gage installed November 4, 1916.

DISCHARGE MEASUREMENTS.—Made from cable one-half mile above gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; very rough; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 6.95 feet at 11 a. m. March 7 (discharge, 1,920 second-feet); minimum stage from water-stage recorder, 2.30 feet September 5 (discharge, 4.7 second-feet).

1910–1918: Maximum stage recorded, between 8 and 10 feet January 25, 1914. A camper at the bridge said that on that date the water touched the under stringers of the footbridge (discharge not determined); minimum stage recorded, 0.70 foot (old gage) September 15, 1913 (discharge, 3 second-feet); lower stages have given higher discharges.

DIVERSIONS.—At Harden ranch, 7 miles above the mouth, water is diverted for use in vicinity of Groveland.

REGULATION.—A small amount of storage is developed at Harden ranch.

ACCURACY.—Stage-discharge relation has not changed in several years. Rating curve well defined. Mean daily gage height determined by averaging mean hourly gage heights. Daily discharge ascertained by applying mean daily gage height to rating table, except December 1, February 6, 7, 21, 24, March 6, 10, and 18, when hourly discharge was averaged. Records good.

Discharge measurements of South Fork of Tuolumne River near Buck Meadows, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 10	2.42	6.5	Feb. 28	3.57	66	May 4	5.57	654
18	2.69	16	Mar. 5	3.74	87	24	5.22	486
Nov. 5	2.50	8.2	8	4.82	315	28	4.72	296
20	2.55	8.8	12	6.56	1,480	31	4.88	338
30	2.57	9.8	Apr. 1	4.89	350	June 14	4.48	218
Dec. 5	2.78	16	22	5.24	499	Aug. 9	2.40	4.9
Feb. 25	3.95	116						

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Daily discharge, in second-feet, of South Fork of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.5	8	26	14	15	64	365	484	393	45	9	6.5
2	8.5	8	42	14	20	67	358	552	424	72	8.5	6
3	8.5	8	28	13	17	72	286	543	412	67	8.5	6
4	8.5	8	19	13	18	85	247	640	420	52	8	4.8
5	8.5	8	16	13	18	100	232	645	412	45	7	4.7
6	8	10	15	13	33	263	235	605	400	40	7	4.8
7	8	11	14	13	174	1,050	232	610	390	36	7	5
8	8	10	13	13	54	362	250	595	382	32	6	6
9	8	10	14	13	38	210	286	464	348	30	6	5.5
10	7	10	14	12	31	393	348	400	330	28	6	5.5
11	6.5	9.5	13	12	29	682	344	358	316	26	6	5
12	7	10	13	17	27	930	340	382	286	24	6	5.5
13	7	11	14	19	31	460	334	472	250	23	6	7.5
14	7	10	15	17	32	320	280	548	222	22	6	24
15	7	10	12	17	27	259	280	520	188	21	6	16
16	7.5	10	11	15	24	238	289	408	173	19	6.5	12
17	8	10	13	15	41	222	330	448	166	18	6.5	10
18	13	9.5	13	16	36	424	376	400	144	17	6.5	8.5
19	8	9.5	13	16	31	1,100	390	448	130	16	6.5	7
20	8	9.5	13	13	38	498	412	494	130	15	6	7
21	8	9.5	12	13	98	368	460	480	120	14	6	7
22	8	9.5	12	13	326	320	502	498	108	13	6	8
23	8	9.5	12	15	181	295	516	502	90	14	6	9.5
24	8	9.5	12	15	525	286	507	480	82	13	5.5	9
25	8	9.5	13	15	143	286	502	460	73	12	5.5	8
26	8	9.5	22	14	100	379	448	404	65	12	5.5	7
27	8	9.5	24	12	82	570	440	354	59	12	5.5	6.5
28	8	9.5	19	16	72	368	436	312	54	10	5.5	7
29	8	10	16	18	.....	330	494	286	50	10	4.8	10
30	8	10	15	16	.....	330	460	292	47	9.5	4.8	15
31	8	.....	14	14	.....	351	.....	365	.....	9	6	.....

Monthly discharge of South Fork of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	13	6.5	8.02	493
November	11	8	9.53	567
December	42	11	16.2	996
January	19	12	14.5	892
February	524	15	80.7	4,480
March	1,100	64	377	23,200
April	516	232	366	21,800
May	645	286	466	28,700
June	424	47	222	13,200
July	72	9	25.0	1,540
August	9	4.8	6.33	389
September	24	4.7	8.14	484
The year	1,100	4.7	134	96,700

MIDDLE FORK OF TUOLUMNE RIVER NEAR BUCK MEADOWS, CALIF.

LOCATION.—In NW. ¼ NW. ¼ sec. 28, T. 1 S., R. 18 E., 800 feet below Hog ranch road highway bridge, half a mile above junction with South Fork of Tuolumne River, and 4 miles east of Buck Meadows, Mariposa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 23, 1916, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made from Hog ranch road bridge or by wading.

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CHANNEL AND CONTROL.—Bed consists of gravel; permanent. Control is granite ledge across channel 100 feet below gage. One channel at all stages, straight for 100 feet above and 200 feet below gage; banks clear.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.32 feet at 5.30 a. m. March 19 (discharge, 558 second-feet); minimum stage, from water-stage recorder, 0.71 foot September 5 and 6 (discharge, 1.7 second-feet).

1917–1918: Maximum stage from water-stage recorder, 6.7 feet at 4 p. m. February 21, 1917 (discharge 912 second-feet); minimum stage, from water-stage recorder, 0.71 foot September 5 and 6, 1918 (discharge 1.7 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 600 second-feet and extended above. Mean daily gage height determined by inspecting recorder graph. Mean daily discharge ascertained by applying mean daily gage height to rating table except February 21, 23, 24, March 6, 10, and September 30, when mean hourly discharge was averaged. Records excellent.

Discharge measurements of Middle Fork of Tuolumne River near Buck Meadows, Calif., during the year ending Sept. 30, 1918.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 8	0.76	2.0	Mar. 9	2.17	49	Apr. 24	3.50	207
17	.72	1.8	13	3.00	130	May 6	4.05	298
Nov. 7	.90	3.4	14	2.68	98	June 13	3.20	155
Dec. 29	1.17	7.7	Apr. 11	2.90	116	Aug. 8	.82	2.5
Feb. 26	1.74	25	20	3.15	153			

Daily discharge, in second-feet, of Middle Fork of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.9	2.0	7.5	6.0	5.0	21	102	239	248	29	5.5	2.5
2	2.8	2.1	12	5.5	6.0	21	105	273	264	47	5.5	2.4
3	2.7	2.1	9.5	5.5	5.0	23	86	273	264	45	5.0	2.3
4	2.5	2.3	6.5	4.9	5.5	26	73	325	273	35	4.0	1.9
5	2.4	2.4	6.0	5.0	6.0	29	70	334	264	30	3.5	1.7
6	2.3	3.2	5.5	5.5	11	104	73	316	264	26	3.3	1.7
7	2.2	3.6	4.7	5.0	45	298	70	325	264	24	3.0	1.9
8	2.1	3.9	4.2	5.5	17	92	80	307	256	22	2.7	2.0
9	2.1	4.3	4.7	5.0	14	57	93	239	231	20	2.7	2.1
10	2.0	4.0	4.9	3.9	13	120	113	201	223	18	2.8	2.0
11	2.0	3.6	4.3	3.7	12	190	116	184	215	17	2.8	2.0
12	2.0	3.9	4.2	6.5	12	307	119	204	199	16	2.8	2.0
13	2.0	4.4	4.4	7.0	13	132	116	256	172	16	2.8	2.9
14	1.9	4.6	4.9	6.5	12	100	99	298	154	15	2.9	6.0
15	1.9	4.3	4.4	6.5	9.5	83	102	290	130	15	3.0	7.5
16	1.8	4.0	4.4	6.5	10	76	109	231	118	14	3.2	7.0
17	1.8	3.9	5.0	6.0	15	70	126	256	112	14	3.4	4.9
18	1.8	3.7	5.0	6.5	12	120	143	231	97	13	3.4	3.7
19	1.9	3.9	5.5	6.0	12	307	150	264	86	12	3.4	3.2
20	1.9	3.9	5.5	4.3	14	138	162	290	86	12	3.2	2.8
21	1.9	3.7	5.0	5.0	39	108	182	290	77	10	3.2	2.8
22	1.9	3.7	5.0	4.4	104	96	207	290	66	10	3.0	3.7
23	2.0	3.7	5.0	5.5	89	89	223	298	57	10	2.9	3.6
24	1.9	3.9	5.0	5.5	165	86	223	290	53	9	2.6	3.4
25	1.9	4.2	5.5	5.5	41	86	223	273	46	9	2.6	3.5
26	1.9	4.3	7.5	4.2	29	118	201	248	42	8.5	2.6	3.3
27	1.9	4.3	10.0	3.0	24	161	199	207	38	8	2.5	3.2
28	2.3	4.0	8.5	5.0	22	105	197	180	34	7	2.1	3.3
29	2.3	4.0	7.0	6.0	.....	90	231	167	32	6.5	1.9	4.3
30	2.1	4.3	6.5	5.0	.....	89	223	173	30	6	1.9	9.5
31	2.0	.....	5.5	5.0	.....	95	.....	223	.....	6	2.7	.....

NOTE.—No gage-height record Jan. 28–31; discharge estimated.

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Monthly discharge of Middle Fork of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2.9	1.8	2.10	129
November	4.6	2.0	3.67	218
December	12	4.2	5.92	364
January	7	3.0	5.34	328
February	165	5	27.2	1,510
March	307	21	111	6,830
April	281	70	141	8,390
May	334	167	257	15,800
June	273	30	146	8,690
July	47	6	17.1	1,050
August	5.5	1.9	3.13	192
September	9.5	1.7	3.44	206
The year	334	1.7	60.4	43,700

SIERRA & SAN FRANCISCO POWER CO.'S CANAL[1] NEAR LA GRANGE, CALIF.

LOCATION.—In SW. ¼ sec. 16, T. 3 S., R. 14 E., at short flume opposite La Grange dam just above waste gate, three-fourths mile above power house, 1¼ miles northeast of La Grange, Stanislaus County, and 13¾ miles below intake on Tuolumne River.

RECORDS AVAILABLE.—1908 to September 30, 1918 (not complete).

GAGE.—Enameled vertical staff on right side of flume near upper end; read by H. T. Sackett.

DISCHARGE MEASUREMENTS.—Made in flume just below gage.

CHANNEL AND CONTROL.—Rectangular ditch excavated mostly in shale rock.

EXTREMES OF DISCHARGE.—Maximum discharge recorded, 68 second-feet most of summer of 1916, part of 1917, and summer of 1918.

ACCURACY.—Stage-discharge relation changed from previous years. Rating curve fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by Turlock irrigation district through R. V. Meikle, chief engineer.

The Sierra & San Francisco Power Co.'s canal takes water from the south side of Tuolumne River at Indian Bar, in SW. ¼ sec. 6, T. 2 S., R. 15 E., about 15 miles above the town of La Grange. This canal was built in the early days to supply water for hydraulic mining in the vicinity of La Grange, and is now locally known as the "La Grange mining ditch." Having been thoroughly repaired, it is used as a supply canal for the hydroelectric plant that was installed in the last part of 1907. The power house in on the left bank of the river about one-half mile above the town of La Grange and is below the dam and headworks of the Turlock and Modesto irrigation canals. Water diverted by canal is returned to river at power house.

Discharge measurements of Sierra & San Francisco Power Co.'s canal near La Grange, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 25	Charles Leidl	2.89	67
July 30	J. F. Kunesh	2.83	66

[1] Owned and operated by Yosemite Power Co. until 1917.

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Daily discharge, in second-feet, of Sierra & San Francisco Power Co.'s canal near La Grange, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	61	61	64	61	61	64	64	64	68	68	64	64
2	61	61	61	61	64	64	64	64	68	68	64	64
3	61	61	61	61	64	64	64	64	68	68	64	64
4	61	61	61	61	64	64	64	64	42	68	64	64
5	61	61	61	a 61	64	64	64	64	68	68	64	64
6	61	61	61	61	64	64	64	64	68	68	64	58
7	61	61	61	61	64	16.6	64	11.7	68	68	58	64
8	61	61	61	61	64	18.7	64	b 43	64	68	64	64
9	61	61	61	61	64	64	64	68	68	64	64	64
10	55	61	a 61	61	64	64	42	64	68	68	64	64
11	51	61	61	61	64	61	64	68	68	68	64	39
12	61	61	61	61	64	58	64	68	68	64	64	64
13	61	b 41	61	61	64	48	64	68	68	64	64	b 43
14	61	61	61	61	64	61	64	a 45	68	64	42	64
15	61	61	61	61	64	64	64	45	68	64	64	64
16	61	61	61	61	64	64	64	68	68	64	64	64
17	61	61	61	61	64	b 43	64	68	68	64	64	b 43
18	61	61	61	61	64	64	64	39	68	64	64	64
19	61	b 41	61	61	64	34	64	68	68	64	b 43	64
20	61	61	61	61	64	64	64	b 68	68	64	64	64
21	61	61	61	61	64	64	64	68	68	64	b 43	64
22	61	61	61	61	64	64	b 43	b 45	68	64	64	64
23	61	61	61	61	64	64	64	a 45	68	64	64	64
24	61	61	61	61	58	64	64	68	68	64	64	64
25	61	b 41	61	61	64	64	64	68	68	64	64	b 43
26	b 41	61	61	61	64	64	64	68	68	64	64	64
27	61	61	61	61	64	61	64	68	68	64	64	b 43
28	61	61	61	61	64	64	64	b 45	68	64	64	64
29	61	61	61	61	.....	64	61	68	68	64	64	64
30	61	61	61	61	.....	64	64	68	68	64	64	64
31	61	.....	61	61	.....	64	.....	68	.....	64	64	.....

a No gage-height record; discharge interpolated.
b No gage-height record: discharge estimated as two-thirds of that for day following.

Monthly discharge of Sierra & San Francisco Power Co.'s canal at La Grange, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	61	41	59.8	3,680
November	61	41	59.0	3,510
December	64	61	61.1	3,760
January	61	61	61.0	3,750
February	64	58	63.7	3,540
March	64	16.6	58.4	3,590
April	64	42	62.5	3,720
May	68	11.7	59.8	3,680
June	68	42	67.0	3,990
July	68	64	65.3	4,020
August	64	42	61.7	3,790
September	64	39	60.2	3,580
The year	68	11.7	61.6	44,600

MODESTO CANAL NEAR LA GRANGE, CALIF.

LOCATION.—In SE. ¼ sec. 17, T. 3 S., R. 14 E., below waste gates, 460 feet below intake at La Grange dam on Tuolumne River, and about 1½ miles northeast of La Grange, Stanislaus County; canal is on right bank of river.

RECORDS AVAILABLE.—April 26, 1903, to September 30, 1918.

GAGE.—Vertical iron staff in concrete well on left bank 460 feet below head gates and below waste gates. Gage read and operation of head gates noted by F. A. Townsend.

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DISCHARGE MEASUREMENTS.—Made from footbridge 550 feet below gage.

CHANNEL AND CONTROL.—Canal is concrete lined and control is length of canal. For the last few years timber flumes that formed the canal a mile or more below the station have been gradually replaced by fills with concrete lining; and the cross-section was increased. The discharge per foot stage above 1.5 feet has been increased.

EXTREMES OF DISCHARGE.—1903-1918: Maximum stage recorded, 6.1 feet part of June, 1918 (discharge, 1,220 second-feet).

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to hundredths twice daily and manipulation of gates noted. Daily discharge ascertained by applying mean daily gage height to rating table or by averaging results obtained by applying gage heights for parts of day to rating table. Records excellent.

COOPERATION.—Gage-height record and some discharge measurements furnished by Modesto irrigation district.

The water is used for irrigation in the Modesto irrigation district.

Discharge measurements of Modesto canal near La Grange, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 25	Charles Leidl	5.92	1,170	Apr. 20	Modesto irrigation district.	5.00	985
July 30	J. F. Kunesh	.60	37				
Apr. 16	Modesto irrigation district.	2.00	309	20	do	5.50	1,120
				20	do	5.50	1,120
16	do	3.00	528	May 22	do	5.81	1,140
16	do	4.00	727	22	do	5.91	1,170
17	do	4.00	755	June 4	do	6.00	1,190
17	do	4.51	887				

Daily discharge, in second-feet, of Modesto canal near La Grange, Calif., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	.....	287	.....	969	1,190	544	38
2	.....	277	162	1,060	1,190	502	36
3	.....	318	502	1,060	1,190	584	39
4	.....	115	605	1,060	1,190	669	23
5	.....	267	669	1,060	1,190	523	23
6	.....	267	713	1,060	1,190	420	39
7	.....	564	713	1,060	1,190	359	35
8	.....	969	713	1,060	1,190	298	33
9	80	1,040	713	1,060	1,190	256	26
10	155	1,060	713	1,060	1,190	226	28
11	120	1,060	713	1,060	1,220	205	22
12	135	1,060	713	1,060	1,220	191	11.7
13	37	1,060	713	1,090	1,220	167	13.0
14	79	1,060	713	1,120	1,220	147	7.0
15	185	1,060	713	1,120	1,220	141	.....
16	159	1,060	713	1,120	1,220	126	.....
17	153	757	757	1,120	1,220	118	.....
18	267	100	826	1,120	1,220	107	.....
19	179	.....	826	1,140	1,220	100	.....
20	163	.....	826	1,140	1,220	92	.....
21	191	.....	826	1,140	1,220	86	.....
22	277	.....	826	1,140	1,220	82	.....
23	263	.....	826	1,190	1,220	77	.....
24	.....	.....	897	1,190	1,220	72	.....
25	297	283	945	1,190	1,090	68	.....
26	462	669	945	1,190	1,090	61	.....
27	380	897	945	1,190	897	58	.....
28	158	1,040	945	1,190	757	50	.....
29	.....	1,060	945	1,190	669	43	.....
30	.....	1,060	945	1,190	584	42	.....
31	.....	488	.....	1,190	.....	44	.....

NOTE.—No flow Oct. 1 to Feb. 8, Feb. 24, Mar. 19-24 and Aug. 15 to Sept. 30.

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Monthly discharge of Modesto canal near La Grange, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February	462	0.0	134	7,440
March	1,060	.0	577	35,500
April	945	.0	735	43,700
May	1,190	969	1,120	68,900
June	1,220	584	1,140	67,800
July	669	42	208	12,800
August 1-14	39	.0	12.1	744
The year	1,220	.0	326	237,000

TURLOCK CANAL NEAR LA GRANGE, CALIF.

LOCATION.—Close to north line of NW. ¼ NW. ¼ sec. 21, T. 3 S., R. 14 E., just below H. T. Sackett's house and barn, 2,400 feet below intake at La Grange dam, and 1¼ miles northeast of La Grange, Stanislaus County. Canal is on left bank of Tuolumne River.

RECORDS AVAILABLE.—July, 1899, to September 30, 1918.

GAGE.—Float gage in 8-inch pipe on left bank, 150 feet below observer's house. Previous gage, used until September 14, 1915, was float gage in well just below spillway and about 150 feet below intake tunnel. Gage read by H. T. Sackett.

DISCHARGE MEASUREMENTS.—Made from foot plank across lined section of canal at Snake Ravine, about a mile below gage.

CHANNEL AND CONTROL.—Cut partly lined and fill completely lined. Control is length of channel.

EXTREMES OF DISCHARGE.—1907-1918: Maximum stage recorded, 8.06 feet May 19, 22, and 26 (discharge, 1,750 second-feet); no flow during periods each year. Capacity of canal is about 1,800 second-feet.

ACCURACY.—Stage-discharge relation changed when canal was shut down for the fall. Rating curves well defined. Gage read to hundredths once daily and regulation of head gate recorded. Daily discharge ascertained by applying gage height to rating table and weighting discharges according to duration. Records excellent.

COOPERATION.—Gage-height record and most of discharge measurements furnished by Turlock irrigation district through, R. V. Meikle, chief engineer.

The water is used to irrigate 95,698 acres of Turlock irrigation district.

Discharge measurements of Turlock canal near La Grange, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 26	Charles Leidl	7.98	1,710
July 30	J. F. Kunesh	.58	89
Aug. 22	Charles Leidl	.22	62

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Daily discharge, in second-feet, of Turlock canal near La Grange, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	52	.....	160	88	667	182	1,630	1,300	1,110	95	42
2	52	.....	145	84	646	175	1,660	1,300	1,080	87	57
3	52	.....	116	81	910	254	1,680	1,380	1,240	95	61
4	52	.....	116	81	910	386	1,690	1,430	1,400	116	68
5	52	.....	130	81	1,030	466	1,710	1,430	1,080	145	46
6	.....	.....	138	81	841	562	1,720	1,430	841	88	53
7	.....	.....	116	205	470	662	1,720	1,520	752	87	29
8	.....	.....	109	774	489	769	1,720	1,550	626	77	29
9	.....	.....	102	818	489	882	1,720	1,580	546	62	28
10	.....	62	95	398	489	946	1,720	1,640	489	68	31
11	.....	102	95	364	527	995	1,720	1,660	452	52	38
12	.....	130	102	330	489	1,040	1,720	1,660	416	52	22
13	.....	74	102	452	470	1,060	1,720	1,700	452	52	.....
14	.....	74	123	452	489	1,000	1,720	1,720	347	62	.....
15	.....	88	220	416	298	910	1,720	1,720	330	62	.....
16	.....	85	190	347	235	910	1,720	1,720	298	62	88
17	.....	85	182	330	147	910	1,720	1,720	282	62	88
18	.....	85	175	566	.....	910	1,720	1,680	250	81	88
19	.....	74	175	416	.....	1,020	1,750	1,660	235	102	123
20	.....	74	205	364	.....	1,100	1,720	1,660	220	102	123
21	.....	74	175	381	.....	1,190	1,720	1,720	212	74	116
22	.....	74	145	489	.....	1,300	1,750	143	198	62	109
23	.....	74	130	489	.....	1,360	1,720	620	190	38	102
24	.....	74	116	688	.....	1,420	1,690	1,420	168	34	102
25	.....	74	116	818	124	1,450	1,710	1,620	160	32	109
26	.....	74	102	958	182	1,500	1,750	1,600	145	27	116
27	.....	74	102	818	175	1,560	1,720	1,270	130	25	95
28	.....	266	102	752	175	1,600	1,640	1,520	116	25	109
29	.....	347	95	.....	175	1,630	1,520	1,430	109	26	102
30	.....	298	68	.....	175	1,630	1,300	1,270	102	26	116
31	.....	175	81	.....	175	.....	1,300	.....	109	31	.....

NOTE.—No gage-height record Aug. 12–17, Aug. 23 to Sept. 3, and Sept. 5–15; discharge estimated from flow of Tuolumne River above the dam and flow of Yosemite Power Co.'s canal and Modesto canal. No flow in canal Oct. 6 to Dec. 9, Mar. 18–24 and Sept. 13–15.

Monthly discharge of Turlock canal near La Grange, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	52	0	8.39	516
November	0	0	0.0	0
December	347	0	81.8	5,030
January	220	68	130	7,990
February	958	81	433	24,000
March	1,030	0	348	21,400
April	1,630	175	993	59,100
May	1,750	1,300	1,680	103,000
June	1,720	143	1,470	87,500
July	1,400	102	454	27,900
August	145	25	64.8	3,980
September	123	0	69.7	4,150
The year	1,750	0	476	345,000

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STANISLAUS RIVER AND TRIBUTARIES.

MIDDLE FORK OF STANISLAUS RIVER AT SAND BAR FLAT, NEAR AVERY, CALIF.

LOCATION.—At Sand Bar Flat, in Tuolumne County, 3 miles below Bakers Crossing, 11 miles above junction with North Fork of Stanislaus River, and 11 miles southeast of Avery, Calaveras County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 1, 1905, to September 30, 1918.

GAGE.—Staff showing depth of water over crest of dam. There is also a staff in flume below dam.

DISCHARGE.—Flow over dam is computed from formula developed by company. Current-meter measurements are made in flume. Discharge, as published, is combined flow of river over dam and discharge of flume.

CHANNEL AND CONTROL.—See preceding paragraph.

EXTREMES OF DISCHARGE.—1905–1918: Maximum mean daily discharge, 9,760 second-feet, March 19, 1907; minimum mean daily discharge, 46 second-feet, February 1, 1918.

ICE.—No information.

DIVERSIONS.—None.

REGULATION.—Relief reservoir (capacity of 16,000 acre-feet), on Relief Creek about a mile above the mouth of the creek, is used to store water.

COOPERATION.—Daily discharge record furnished by Sierra & San Francisco Power Co., through H. J. Jackson, general manager. Discharge measurements furnished by the South San Joaquin irrigation district, through A. Griffin, engineer.

Discharge measurements of Middle Fork of Stanislaus River at Sand Bar Flat, near Avery, Calif., during the year ending Sept. 30, 1918.

[Made by W. H. Hooker.[a]]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 3	3.55	[b] 232	Oct. 8	3.60	[b] 236
5	.52	[b] 8.4	8	3.41	[b] 226
5	3.81	[c] 182	8	3.17	[b] 200
6	3.71	[c] 161			

[a] See paragraph on cooperation, p. 13.
[b] Measurement made in flume.
[c] Measurement made 1 mile above dam.

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Daily discharge, in second-feet, of Middle Fork of Stanislaus River at Sand Bar Flat, near Avery, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	270	187	131	93	46	112	1,230	2,000	1,390	649	286	252
2	257	202	156	95	54	122	1,350	2,090	1,620	803	290	270
3	229	203	98	94	64	157	951	2,020	1,970	660	288	271
4	222	226	103	96	57	170	814	2,220	2,270	613	285	269
5	230	220	123	133	62	172	721	2,290	2,220	547	292	269
6	210	225	139	91	68	154	802	2,010	2,360	515	289	269
7	166	223	124	75	204	389	834	2,090	2,410	444	300	260
8	221	198	133	75	127	262	912	1,910	2,510	355	286	266
9	234	212	115	75	81	184	1,130	1,560	2,530	313	277	266
10	234	225	108	66	87	198	1,500	1,360	2,560	283	291	268
11	170	211	109	53	91	554	1,580	1,230	2,730	286	295	269
12	168	205	115	79	91	658	1,580	1,340	2,850	281	292	268
13	169	195	97	70	112	537	1,450	1,560	2,860	277	278	275
14	167	198	110	83	93	370	1,190	1,740	2,830	289	292	293
15	155	207	107	76	82	375	1,150	1,620	2,520	290	292	295
16	155	234	96	70	78	392	1,260	1,430	2,160	280	293	261
17	164	230	100	72	103	383	1,410	1,470	2,010	287	294	241
18	179	182	116	65	91	473	1,600	1,360	1,880	286	292	232
19	190	116	143	72	88	630	1,540	1,430	1,770	292	282	218
20	183	138	90	60	88	517	1,580	1,550	1,660	292	293	202
21	182	135	99	57	99	516	1,830	1,560	1,520	274	290	195
22	184	115	112	62	136	542	2,060	1,580	1,370	280	290	155
23	181	115	113	60	115	561	2,160	1,600	1,350	294	291	181
24	180	112	114	82	153	606	2,060	1,540	1,230	293	291	174
25	152	97	108	68	99	680	2,020	1,530	1,060	293	276	159
26	174	95	105	64	113	791	1,930	1,410	946	293	290	141
27	214	102	145	53	118	828	1,910	1,240	931	290	282	133
28	233	162	110	52	116	686	1,780	1,060	859	256	241	149
29	210	165	100	52	.....	738	1,860	956	804	268	246	166
30	198	115	96	57	.....	876	1,790	952	698	268	247	276
31	183	.....	95	60	.....	1,060	.....	1,190	.....	284	250	.....

Monthly discharge of Middle Fork of Stanislaus River at Sand Bar Flat, near Avery, Calif, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	270	152	196	12,100
November	234	95	175	10,400
December	156	90	113	6,950
January	133	52	72.9	4,480
February	204	46	97.0	5,390
March	1,060	112	474	29,100
April	2,160	721	1,470	87,500
May	2,290	952	1,580	97,200
June	2,860	698	1,860	111,000
July	803	256	359	22,100
August	300	241	283	17,400
September	295	133	231	13,700
The year	2,860	46	576	417,000

STANISLAUS RIVER NEAR KNIGHTS FERRY, CALIF.

LOCATION.—In SW. ¼ sec. 1, T. 1 S., R. 12 E., 300 feet above old Tulloch dam, 2 miles above Goodwin dam, and 6 miles above Knights Ferry, Stanislaus County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 18, 1915, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank in reinforced concrete well and house. Previous to July 28, 1917, record is from a Gurley printing water-stage recorder.

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DISCHARGE MEASUREMENTS.—Made from cable 20 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed consists of solid rock and shifting sand; channel straight for 250 feet above and 300 feet below; one channel at all stages. Control is Tulloch dam. Point of zero flow, gage height 0.9 foot.

EXTREME OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 7.95 feet at 9 a. m. March 12 (discharge, determined from extension of rating curve, 14,300 second-feet); minimum stage, from water-stage recorder, 1.03 feet at 8 a. m. January 29 (discharge, 58 second-feet).

1916–1918: Maximum stage recorded, 9.11 feet at 3.45 a. m. February 21, 1917 (discharge, determined from extension of rating curve, 17,400 second-feet); minimum stage recorded, 1.03 feet at 8 a. m. January 29, 1918 (discharge, 58 second-feet).

DIVERSIONS.—Ditches diverting water for mining are numerous above the station. Water is also diverted from the South Fork into Tuolumne Basin and from North Fork for use in the vicinity of Murphy and Angels (see Utica Gold Mining Co.'s canal near Avery, p. 168). The water diverted for power development on Middle Fork at Sand Bar Flat near Avery is returned to river above this station.

REGULATION.—Flow is partly regulated by storage in the drainage basins of the Middle Fork (see Relief Creek near Baker Station, p. 165), North Fork, and South Fork.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 10,000 second-feet and is an extension above. Recorder not running during periods stated in footnote to daily-discharge table. Mean daily gage height determined by inspecting record. Daily discharge ascertained by applying mean daily gage height to rating table except March 12 and 19 when hourly discharge was averaged; estimates for periods in November and December obtained from maximum and minimum stages recorded during the periods; estimates of flow for periods in February and March made by comparison with the records from gage heights at the Goodwin dam; for other days for which gage height was not recorded, discharge was interpolated. Records excellent except those estimated.

This station takes the place of the station at Knights Ferry which was discontinued April 30, 1916.

Discharge measurements of Stanislaus River near Knights Ferry, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 10	Charles Leidl	1.34	224
May 21	do	3.42	3,130
July 31	J. F. Kunesh	1.36	246

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Daily discharge, in second-feet, of Stanislaus River near Knights Ferry, Calif.,
year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	A
1	294	236	207	199	135	390	2,780	4,040	1,930	608	
2	276	237	207	196	135	390	2,950	4,380	2,380	551	
3	276	242	207	193	140	390	2,300	4,260	3,040	608	
4	276	242	207	193	140	390	1,840	4,610	3,460	551	
5	281	209	201	184	130	430	1,620	4,940	3,460	542	
6	281	209	196	140	151	470	1,620	4,260	3,580	462	
7	281	209	196	141	450	7,080	1,650	4,380	3,690	406	
8	281		184	142	497	3,240	1,820	4,260	3,690	362	
9	281		184	145	314	1,380	2,170	3,580	3,890	355	
10	281		182	146	281	1,320	3,150	2,720	3,890	320	
11	196		173	146	237	2,760	3,280	2,320	3,800	288	
12	195		164	140	237	11,800	3,580	2,200	4,040	314	
13	195		164	151	237	4,600	3,150	2,720	4,040	307	
14	199		173	151	288	2,170	2,460	3,260	4,150	294	
15	199		168	173	300	1,570	2,320	3,200	3,690	307	
16	195		162	156	274	1,400	2,380	2,890	3,000	30	
17	195			146	355	1,200	2,740	2,870	2,610	30	
18	195			146	348	1,600	3,200	2,670	2,400	29	
19	195	202		151	300	8,210	3,060	2,650	1,970	2	
20	195			156	268	3,460	3,310	2,980	1,890	3	
21	201	178		135	560	2,380	3,690	3,040	1,740		
22	195	156		135	2,340	1,970	4,260	3,000	1,530		
23	195	156		135	1,140	1,860	4,500	3,170	1,350		
24	207	158		135	3,680	1,780	4,260	3,000	1,230		
25	219	148		135	1,000	1,840	4,040	2,820	1,010		
26	207	152		140	588	2,030	3,920	2,610	888		
27	201	156	265	130	515	2,700	3,920	2,300	818		
28	225	148	225	135	454	1,980	3,580	1,860	760		
29	213	156	201	90		1,880	3,920	1,530	686		
30	201		178	95		2,090	3,920	1,370	608		
31	202			90		2,400		1,340			

NOTE.—Discharge for days for which gage height is not recorded determined as f
from the gage heights at the Goodwin dam, Jan. 2, 3, 7-9, and Sept. 18-20 interpolat

Monthly discharge of Stanislaus River near Knights Ferry, Calif.,
Sept. 30, 1918.

Month.	Discharge in second-	
	Maximum.	Minimum
[illegible]	320	[illegible]
[illegible]	327	[illegible]
[illegible]	190	
[illegible]	3,690	
[illegible]	11,800	[illegible]
[illegible]	4,500	[illegible]
[illegible]	4,840	
[illegible]	4,150	
[illegible]	608	
[illegible]	314	
[illegible]	560	
The year	11,800	

WILLOW RESERVOIR, NO

LOCATION.—Dam is in NW. ¼ sec. 13, T.
eight miles above junction with Bas
tim, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1910, to Se

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GAGE.—No information.

EXTREMES OF STORAGE.—1910–1918: Maximum storage recorded, 15,600 acre-feet July 26, 1917; reservoir empty during parts of each year.

COOPERATION.—Daily-storage record furnished by Sierra & San Francisco Power Co., through H. F. Jackson, general manager.

The reservoir is used for storage for power by the Sierra & San Francisco Power Co. The water is released down Relief Creek to the Middle Fork of Stanislaus River at Sand Bar Flat, where it is diverted.

Daily storage, in acre-feet, of Relief reservoir near Baker Station, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.
1	10,200	6,500	2,400	308	90	4,120	14,600	15,300	12,300	4,420
2	10,000	6,340	2,340	282	182	4,470	15,000	15,300	12,000	4,130
3	9,910	6,160	2,360	237	230	4,810	15,200	15,300	11,800	3,980
4	9,800	5,960	2,300	124	259	5,200	15,000	15,300	11,500	3,750
5	9,770	5,760	2,220	.....	290	5,700	15,100	15,200	11,300	3,540
6	9,700	5,650	2,110	.....	310	6,120	15,200	15,200	11,000	3,320
7	9,580	5,540	1,990	.....	337	6,620	15,200	15,200	10,800	3,090
8	9,620	5,380	1,900	.....	372	7,050	15,300	15,200	10,500	2,930
9	9,520	5,080	1,840	.....	402	7,300	15,200	15,200	10,200	2,720
10	9,260	5,040	1,760	.....	478	7,550	15,200	15,300	9,870	2,520
11	9,160	4,920	1,620	.....	602	7,720	15,300	15,300	9,600	2,330
12	9,070	4,820	1,550	.....	690	7,920	15,300	15,200	9,380	2,080
13	9,010	4,670	1,500	.....	784	8,100	15,300	15,200	9,080	1,880
14	8,940	4,520	1,430	.....	874	8,500	15,300	15,200	8,840	2,040
15	8,860	4,280	1,390	.....	984	8,850	15,100	15,100	8,520	2,040
16	8,840	4,020	1,340	.....	1,030	9,140	15,100	15,000	8,190	1,980
17	8,660	3,740	1,280	.....	1,150	9,420	15,100	14,900	7,920	1,870
18	8,540	3,680	1,130	.....	1,260	9,650	15,100	14,800	7,640	1,830
19	8,420	3,620	1,050	.....	1,360	9,940	15,200	14,700	7,430	1,790
20	8,290	3,450	992	.....	1,520	10,400	15,100	14,500	7,120	1,720
21	8,140	3,390	902	.....	1,680	10,700	15,100	14,400	6,860	1,680
22	8,040	3,310	812	.....	1,880	11,200	15,100	14,200	6,560	1,650
23	7,920	3,220	730	.....	2,140	11,700	15,300	14,100	6,280	1,760
24	7,790	3,130	638	.....	2,450	12,100	15,200	13,900	5,980	1,740
25	7,650	3,050	581	.....	2,610	12,600	15,100	13,700	5,680	1,710
26	7,470	2,960	505	.....	2,900	13,000	15,200	13,500	5,450	1,680
27	7,250	2,860	527	.....	3,130	13,300	15,300	13,300	5,210	1,690
28	7,110	2,700	483	.....	3,350	13,500	15,300	13,200	5,060	1,710
29	6,900	2,590	443	.....	3,540	13,700	15,300	13,000	4,920	1,920
30	6,780	2,490	398	.....	3,740	13,800	15,200	12,800	4,820	2,130
31	6,670	.....	346	.....	.....	14,100	.....	12,500	4,600	.....

NOTE.—Reservoir empty Jan. 5 to Mar. 31: no record July 14, storage interpolated.

RELIEF CREEK NEAR BAKER STATION, CALIF.

OCATION.—In NW. ¼ sec. 13, T. 5 N., R. 20 E., one-fourth mile below Relief reservoir of Sierra & San Francisco Power Co., one-fourth mile above junction with East Fork, and 3 miles southeast of Baker Station, Tuolumne County.

AINAGE AREA.—Not measured.

ECORDS AVAILABLE.—Oct[illegible]er, 1910, to September 30, 1918 (incomplete).

GE.—No information.

SCHARGE.—Computed [illegible]-height record at weir, which gives the combined flow over spillway [illegible] outlet gates of dam.

ANNEL AND CONTRO[illegible]ing paragraph.

TREMES OF DISCHAR[illegible] Maximum daily discharge recorded, 795 second-feet, June 2[illegible]rt of 1913 and 1918.

.—No information.

ERSIONS.—None.

GULATION.—See record o[illegible]ge 164.

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Daily discharge, in second-feet, of Stanislaus River near Knights Ferry, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	294	225	207	190	115	390	2,780	4,040	1,930	608	307	219
2	320	237	327	186	115	390	2,950	4,380	2,380	551	314	231
2	320	243	281	182	146	390	2,300	4,260	3,040	608	307	255
4	274	243	231	178	105	390	1,840	4,610	3,460	551	314	249
5	231	219	201	184	130	430	1,620	4,840	3,460	542	268	225
6	231	249	195	140	151	470	1,620	4,260	3,580	462	288	243
7	231	249	190	141	430	7,680	1,650	4,380	3,690	406	288	249
8	201	.....	184	143	497	3,240	1,820	4,260	3,690	362	288	249
9	213	.....	184	145	314	1,380	2,170	3,580	3,800	355	300	243
10	231	.....	162	146	281	1,320	3,150	2,720	3,800	320	274	213
11	195	.....	173	146	237	2,760	3,280	2,320	3,800	288	274	255
12	195	.....	184	140	237	11,800	3,580	2,300	4,040	314	249	243
13	195	.....	184	151	237	4,600	3,150	2,720	4,040	307	288	294
14	190	.....	173	151	288	2,170	2,460	3,260	4,150	294	288	348
15	190	.....	168	173	300	1,570	2,320	3,200	3,690	307	268	560
16	195	.....	162	156	274	1,400	2,380	2,890	3,000	307	281	355
17	195	.....	.....	146	355	1,200	2,740	2,870	2,610	307	268	268
18	195	.....	.....	146	348	1,600	3,200	2,670	2,400	294	274	262
19	195	.....	.....	151	300	8,210	3,060	2,650	1,970	294	268	237
20	195	262	.....	156	268	3,460	3,310	2,980	1,890	307	274	222
21	201	178	.....	135	560	2,380	3,690	3,040	1,740	294	268	207
22	195	156	.....	125	2,340	1,970	4,260	3,000	1,520	314	255	184
23	195	156	.....	105	1,140	1,880	4,500	3,170	1,350	281	255	207
24	207	156	.....	135	3,690	1,780	4,260	3,000	1,230	268	255	190
25	219	168	.....	125	1,000	1,840	4,040	2,820	1,010	268	268	190
26	237	151	.....	140	588	2,030	3,920	2,610	888	281	237	184
27	201	156	.....	130	515	2,700	3,920	2,300	818	294	262	178
28	225	146	255	125	454	1,990	3,580	1,860	760	281	243	178
29	213	156	225	90	.....	1,880	3,920	1,530	686	268	195	184
30	231	156	201	95	.....	2,090	3,920	1,370	608	281	225	178
31	231	.....	178	90	.....	2,400	.....	1,340	.....	294	243	.....

NOTE.—Discharge for days for which gage height is not recorded determined as follows: Nov. 8–19 estimated as 250 second-feet; Dec. 17–27 estimated as 200 second-feet; Feb. 28 to Mar. 8 and Mar. 13–15 estimated from the gage heights at the Goodwin dam, Jan. 2, 3, 7–9, and Sept. 18–20 interpolated.

Monthly discharge of Stanislaus River near Knights Ferry, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	320	190	221	13,600
November	.....	146	217	12,900
December	327	.....	202	12,400
January	190	90	143	8,790
February	3,690	105	551	30,600
March	11,800	390	2,510	154,000
April	4,500	1,620	3,050	181,000
May	4,840	1,340	3,070	189,000
June	4,150	608	2,500	149,000
July	608	268	352	21,600
August	314	195	271	16,700
September	560	178	243	14,500
The year	11,800	90	1,110	804,000

RELIEF RESERVOIR NEAR BAKER STATION, CALIF.

LOCATION.—Dam is in NW. ¼ sec. 13, T. 5 N., R. 20 E., on Relief Creek, about five-eighths mile above junction with East Fork and 3½ miles southeast of Baker Station, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1910, to September 30, 1918.

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GAGE.—No information.

EXTREMES OF STORAGE.—1910–1918: Maximum storage recorded, 15,600 acre-feet July 26, 1917; reservoir empty during parts of each year.

COOPERATION.—Daily-storage record furnished by Sierra & San Francisco Power Co., through H. F. Jackson, general manager.

The reservoir is used for storage for power by the Sierra & San Francisco Power Co. The water is released down Relief Creek to the Middle Fork of Stanislaus River at Sand Bar Flat, where it is diverted.

Daily storage, in acre-feet, of Relief reservoir near Baker Station, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.
1	10,200	6,500	2,400	308	90	4,120	14,600	15,300	12,300	4,420
2	10,000	6,340	2,340	282	182	4,470	15,000	15,300	12,000	4,130
3	9,910	6,160	2,360	237	230	4,810	15,200	15,300	11,800	3,980
4	9,800	5,960	2,300	124	259	5,200	15,000	15,300	11,500	3,750
5	9,770	5,760	2,220	.....	290	5,700	15,100	15,200	11,300	3,540
6	9,700	5,650	2,110	.....	310	6,120	15,200	15,200	11,000	3,320
7	9,580	5,540	1,990	.....	337	6,620	15,200	15,200	10,800	3,090
8	9,620	5,380	1,900	.....	372	7,050	15,300	15,200	10,500	2,930
9	9,520	5,080	1,840	.....	402	7,300	15,200	15,200	10,200	2,720
10	9,260	5,040	1,760	.....	478	7,550	15,200	15,300	9,870	2,520
11	9,160	4,920	1,620	.....	602	7,720	15,300	15,300	9,600	2,330
12	9,070	4,820	1,550	.....	690	7,920	15,300	15,200	9,380	2,080
13	9,010	4,670	1,500	.....	784	8,100	15,300	15,200	9,080	1,880
14	8,940	4,520	1,430	.....	874	8,500	15,300	15,200	8,840	2,040
15	8,860	4,280	1,390	.....	984	8,850	15,100	15,100	8,520	2,040
16	8,840	4,020	1,340	.....	1,030	9,140	15,100	15,000	8,190	1,980
17	8,660	3,740	1,280	.....	1,150	9,420	15,100	14,900	7,920	1,870
18	8,540	3,680	1,130	.....	1,260	9,650	15,100	14,800	7,640	1,830
19	8,420	3,620	1,050	.....	1,360	9,940	15,200	14,700	7,430	1,790
20	8,290	3,450	992	.....	1,520	10,400	15,100	14,500	7,120	1,720
21	8,140	3,390	902	.....	1,680	10,700	15,100	14,400	6,860	1,680
22	8,040	3,310	812	.....	1,880	11,200	15,100	14,200	6,560	1,650
23	7,920	3,220	730	.....	2,140	11,700	15,300	14,100	6,280	1,760
24	7,790	3,130	638	.....	2,450	12,100	15,200	13,900	5,980	1,740
25	7,650	3,050	581	.....	2,610	12,600	15,100	13,700	5,680	1,710
26	7,470	2,960	505	.....	2,900	13,000	15,200	13,500	5,450	1,680
27	7,250	2,860	527	.....	3,130	13,300	15,300	13,300	5,210	1,690
28	7,110	2,700	483	.....	3,350	13,500	15,300	13,200	5,060	1,710
29	6,900	2,590	443	.....	3,540	13,700	15,300	13,000	4,920	1,920
30	6,780	2,490	398	.....	3,740	13,800	15,200	12,800	4,820	2,130
31	6,670	.....	346	.....	.....	14,100	.....	12,500	4,600	.....

NOTE.—Reservoir empty Jan. 5 to Mar. 31: no record July 14, storage interpolated.

RELIEF CREEK NEAR BAKER STATION, CALIF.

LOCATION.—In NW. ¼ sec. 13, T. 5 N., R. 20 E., one-fourth mile below Relief reservoir of Sierra & San Francisco Power Co., one-fourth mile above junction with East Fork, and 3 miles southeast of Baker Station, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October, 1910, to September 30, 1918 (incomplete).

GAGE.—No information.

DISCHARGE.—Computed from gage-height record at weir, which gives the combined flow over spillway and through outlet gates of dam.

CHANNEL AND CONTROL.—See preceding paragraph.

EXTREMES OF DISCHARGE.—1912–1918: Maximum daily discharge recorded, 795 second-feet, June 23, 1914; no flow part of 1913 and 1918.

ICE.—No information.

DIVERSIONS.—None.

REGULATION.—See record of Relief reservoir, page 164.

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COOPERATION.—Daily-discharge record furnished by Sierra & San Francisco Power Co., through H. F. Jackson, general manager.

Daily discharge, in second-feet, of Relief Creek near Baker Station, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.
1	100	85	35	33	6	12	16	99	121	116
2	100	100	16	33	6	13	15	138	126	116
3	50	100	17	33	5.5	13	399	125	126	116
4	50	100	68	83	5.5	13	495	110	126	116
5	25	85	68	9	5.5	13	415	158	129	116
6	65	69	78	7.5	5.5	15	557	89	129	116
7	65	69	78	6.5	5.5	16	629	65	129	116
8	65	100	56	6.5	7	16	499	65	132	100
9	44	88	46	4.6	7	17	540	45	132	100
10	50	88	46	4.6	7	12	515	46	135	116
11	50	48	46	4.6	7.5	13	546	46	135	116
12	50	48	37	4.6	8	17	723	43	135	116
13	34	88	37	4.6	8	17	712	42	129	116
14	50	138	51	.....	8	17	712	88	129	83
15	34	138	37	.....	8	17	577	62	135	62
16	65	174	37	.....	8	17	393	62	135	62
17	86	53	46	.....	8	17	364	74	135	40
18	65	53	122	.....	8	17	361	74	129	40
19	65	53	33	.....	8	17	364	100	135	40
20	65	90	33	.....	8	16	301	100	135	25
21	65	53	58	.....	8	16	301	90	135	25
22	65	53	58	.....	8	16	212	90	135	0
23	65	33	58	.....	8.5	16	240	90	139	9
24	81	33	58	.....	9.5	16	229	96	139	9
25	86	33	33	.....	11	16	182	96	139	9
26	114	45	33	.....	11	16	118	96	139	0
27	114	105	33	.....	12	16	138	96	85	9
28	83	105	33	.....	12	16	138	96	85	9
29	83	60	33	.....	12	16	138	104	85	9.5
30	83	35	33	.....	12	16	116	111	85	9.5
31	85	.....	33	.....	.....	17	.....	121	85	.....

NOTE.—No flow Jan. 14 to Mar. 31.

Monthly discharge of Relief Creek near Baker Station, Calif., for the year ending Sept. 30, 1918

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	114	25	67.2	4,130
November	174	33	77.4	4,610
December	122	16	46.8	2,880
January	83	0	7.56	465
April	12	5.5	8.13	484
May	17	13	15.6	959
June	723	15	365	21,700
July	158	42	87.6	5,390
August	139	85	125	7,690
September	116	0	63.9	3,800
The year	723	0	72.0	52,100

NOTE.—Computed by engineers of U. S. Geological Survey.

NORTH FORK OF STANISLAUS RIVER NEAR AVERY, CALIF.

LOCATION.—In sec. 35, T. 5 N., R. 15 E., 700 feet above intake of Utica Gold Mining Co.'s canal and 5 miles northeast of Avery, Calaveras County.

DRAINAGE AREA.—Not measured.

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RECORDS AVAILABLE.—July 14, 1914, to September 30, 1918.

GAGE.—Vertical staff in two sections on right bank; read by James Hunter.

DISCHARGE MEASUREMENTS.—Made from cable 35 feet below gage or by wading.

CHANNEL AND CONTROL.—Large boulders and gravel; apparently permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.8 feet April 30 and May 1 (discharge, 1,960 second-feet); minimum stage recorded, 0.85 foot November 28 and 30 (discharge, 28 second-feet).

1914–1918: Maximum stage recorded, 8.7 feet May 11, 1915 (discharge, 5,250 second-feet); minimum stage recorded, 0.85 foot November 28 and 30, 1917 (discharge, 28 second-feet.

DIVERSION.—Water is diverted from Beaver Creek into the North Fork of Stanislaus River about half a mile above the station.

REGULATION.—Flow regulated to some extent by reservoirs on the headwaters of this stream.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 50 and 4,000 second-feet. Gage read to half-tenths once on alternate days. Daily discharge ascertained by applying gage to rating table, and interpolated for days on which gage was not read. Records good; low-water records subject to some uncertainty owing to effect of regulation.

COOPERATION.—Gage-height record furnished by Utica Gold Mining Co.

No discharge measurements were made during the year ending September 30, 1918.

Daily discharge, in second-feet, of North Fork of Stanislaus River near Avery, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	66	41	31	38	31	98	585	1,960	675	98	66	47
2	62	46	34	38	31	103	608	1,920	720	213	66	47
3	59	50	36	38	[a] 31	108	630	1,880	745	328	66	47
4	58	52	36	38	108	160	630	1,840	770	328	64	47
5	56	53	36	38	108	212	630	1,790	795	328	62	47
6	54	54	36	38	108	254	652	1,700	820	312	60	46
7	53	56	36	38	103	295	675	1,620	848	295	59	44
8	53	56	34	38	98	401	698	1,470	875	280	59	44
9	53	56	31	38	94	507	720	1,320	848	265	59	44
10	50	54	36	38	89	394	825	1,280	820	238	60	47
11	47	53	41	38	85	280	930	1,250	779	212	62	50
12	47	56	44	38	81	194	960	1,220	770	200	62	60
13	47	56	47	40	79	108	990	1,180	745	189	62	70
14	42	56	52	41	77	94	1,020	1,150	720	178	62	72
15	38	56	56	41	74	81	1,050	1,120	698	168	62	73
16	38	56	58	41	70	90	1,120	1,080	675	150	62	70
17	38	56	59	41	66	99	1,180	1,050	652	133	62	66
18	37	56	60	41	62	108	1,250	1,050	630	120	62	62
19	36	54	62	41	64	168	1,320	1,050	608	108	62	59
20	36	53	64	41	66	202	1,360	990	585	98	60	53
21	36	52	66	41	68	237	1,400	930	546	89	59	47
22	36	50	66	41	70	282	1,470	902	507	81	59	44
23	36	48	66	40	74	328	1,540	875	434	73	59	41
24	36	47	68	38	77	436	1,580	848	361	73	59	41
25	36	42	70	37	83	545	1,620	820	328	73	57	41
26	36	36	70	36	89	630	1,660	795	295	73	55	41
27	36	32	70	34	94	608	1,700	770	222	73	53	41
28	36	28	70	31	98	585	1,790	722	149	73	50	41
29	36	28	70	31	.....	585	1,880	675	89	73	47	41
30	36	28	56	31	.....	585	1,960	630	94	73	47	41
31	36	.....	44	31	.....	585	.....	652	.....	73	47	.....

[a] Estimated by comparison with record of flow of Middle Fork of Stanislaus River near Avery.

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Monthly discharge of North Fork of Stanislaus River near Avery, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	66	36	44.1	2,710
November	56	28	48.7	2,900
December	70	31	51.8	3,190
January	41	31	37.9	2,330
February	108	31	77.8	4,320
March	630	81	302	18,600
April	1,960	585	1,150	68,400
May	1,960	630	1,180	72,600
June	875	89	593	35,300
July	328	73	163	10,000
August	66	47	59.1	3,630
September	73	41	50.5	3,000
The year	1,960	28	313	226,980

UTICA GOLD MINING CO.'S CANAL NEAR AVERY, CALIF.

LOCATION.—In sec. 35, T. 5 N., R. 15 E., 450 feet below headworks on North Fork of Stanislaus River and 5 miles northeast of Avery, Calaveras County.

RECORDS AVAILABLE.—July 14, 1914, to September 30, 1918.

GAGE.—Enameled vertical staff gage, installed May 19, 1915, on right side of flume gage used previous to May 19, 1915, was vertical staff 300 feet above and on the right bank, so near the head gate that it could not be properly rated. Gage read by James Hunter.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

CHANNEL AND CONTROL.—Rectangular wooden flume.

EXTREMES OF DISCHARGE.—1914–1918: Maximum stage recorded, 1.65 feet May 19, 1915 (discharge, 116 second-feet).

ICE.—Stage-discharge relation may be affected by ice but not during the year ending September 30, 1918.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to half-tenths on alternate days. Daily discharge ascertained by applying daily gage height to rating table interpolated for days on which gage was not read except February 3, which was estimated to be the same as the day previous. Records good.

COOPERATION.—Gage-height record furnished by Utica Gold Mining Co.

No discharge measurements were made during the year ending September 30, 1918.

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Daily discharge, in second-feet, of Utica Gold Mining Co's. canal near Avery, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	61	34	24	31	19	70	74	79	79	79	74	46
2	57	36	26	31	19	70	74	79	79	79	72	46
3	53	38	28	31	19	70	74	79	79	79	70	46
4	50	40	28	31	61	70	74	79	79	79	68	46
5	46	42	28	31	64	70	74	79	79	79	66	46
6	46	44	28	31	66	70	74	79	79	76	66	46
7	46	46	28	31	66	70	74	79	79	74	66	46
8	46	46	26	31	66	70	74	79	79	74	64	46
9	46	46	24	31	66	70	74	79	79	74	61	46
10	46	46	28	31	66	70	74	79	79	74	61	54
11	46	46	31	31	66	70	74	79	79	74	61	61
12	38	46	32	31	66	72	74	79	79	72	61	66
13	38	44	34	31	66	74	74	79	79	70	61	70
14	34	42	36	31	66	74	74	79	79	70	61	74
15	31	40	38	31	66	74	74	79	79	70	61	79
16	31	38	40	31	66	74	74	79	79	70	61	74
17	31	36	42	34	60	74	74	79	79	70	61	70
18	31	34	44	38	53	74	74	79	79	70	61	66
19	31	32	46	38	57	74	74	79	79	70	61	61
20	31	31	50	38	61	74	74	79	79	70	61	54
21	31	30	53	36	64	74	74	79	79	70	61	46
22	31	28	53	34	66	74	74	79	79	70	59	46
23	31	28	53	32	66	74	74	79	79	70	57	46
24	31	28	57	31	66	74	76	79	79	70	57	46
25	31	28	61	28	66	74	79	79	76	70	53	46
26	31	28	61	24	66	74	79	79	74	70	50	46
27	31	26	61	22	68	74	79	79	72	70	46	46
28	31	24	61	19	70	74	79	79	70	70	46	46
29	31	24	61	19	.....	74	79	79	70	70	46	46
30	31	24	31	19	.....	74	79	79	74	70	46	46
31	31	.....	31	19	.....	74	.....	79	.....	70	46	.....

Monthly discharge of Utica Gold Mining Co's. canal near Avery, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	61	31	38.1	2,340
November	46	24	35.8	2,130
December	61	24	40.1	2,470
January	38	19	29.9	1,840
February	70	19	59.7	3,320
March	74	70	72.5	4,460
April	79	74	75.1	4,470
May	79	79	79.0	4,860
June	79	70	77.7	4,620
July	79	70	72.4	4,450
August	74	46	59.5	3,660
September	79	46	53.4	3,180
The year	79	19	57.7	41,800

SOUTH SAN JOAQUIN CANAL[1] NEAR KNIGHTS FERRY, CALIF.

LOCATION.—At footbridge three-fourths mile below head gate at Goodwin dam, on Stanislaus River, and 4 miles above Knights Ferry, Stanislaus County.

RECORDS AVAILABLE.—May 1, 1914, to September 30, 1918. Also miscellaneous measurements and rough estimates for 1913.

[1] Also known as main supply canal.

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GAGE.—Vertical staff in gage well on left bank installed March 12, 1915; original gage was inclined staff on right bank 100 feet below and probably at the same datum. Gage read by W. M. Craig.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Canal has trapezoidal section and is concrete lined.

EXTREMES OF DISCHARGE.—1914–1918: Maximum stage recorded, 8.75 feet May 21, 22, and 23, 1918 (discharge, 891 second-feet), no flow several periods each year.

ACCURACY.—Stage-discharge relation changed when canal was cleaned between February 19 and March 9. Old and new rating curves well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—Daily gage-height record furnished by South San Joaquin irrigation district, through A. Griffin, engineer.

South San Joaquin canal is on the right bank of the river. The water is used for irrigation in the Oakdale and South San Joaquin districts.

Discharge measurements of South San Joaquin canal near Knights Ferry, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 22	Charles Leidl	8.72	887
July 31	J. F. Kunesh	3.27	236

Daily discharge, in second-feet, of South San Joaquin canal near Knights Ferry, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	204	137	13	.....	76	.....	.....	269	872	449	221	177
2	226	137	13	6.2	76	.....	.....	221	872	389	221	134
3	250	137	9.8	20	92	.....	.....	269	872	521	221	177
4	215	137	.....	14	76	.....	17	557	872	437	221	221
5	147	137	.....	.....	76	.....	144	689	872	425	210	188
6	158	137	.....	.....	69	.....	199	749	860	341	210	177
7	158	137	.....	.....	147	.....	106	797	860	329	210	188
8	137	137	11	.....	250	.....	102	847	860	305	210	177
9	127	137	16	.....	272	18.5	102	810	872	293	221	177
10	169	46	11	.....	261	9.7	139	847	872	269	210	177
11	147	.....	.....	.....	215	.....	221	847	872	245	210	188
12	147	.....	.....	.....	158	.....	221	834	872	269	188	177
13	137	.....	.....	.....	147	.....	221	834	872	257	233	221
14	137	.....	.....	13.5	192	7.8	221	847	884	257	221	353
15	127	.....	20	92	204	42	293	847	872	269	221	341
16	147	.....	28	122	169	74	365	847	872	257	221	329
17	137	.....	8.2	137	192	78	341	872	884	245	221	177
18	137	.....	.....	137	261	81	377	884	884	221	221	188
19	147	9.2	.....	132	108	21	377	884	884	221	221	166
20	147	13	.....	127	.....	36	401	884	884	221	221	134
21	147	13	.....	109	.....	42	473	884	884	233	221	144
22	158	13	6.7	84	.....	42	521	884	884	245	199	155
23	204	13	20	80	.....	42	557	884	884	221	199	144
24	215	13	15.4	80	.....	42	545	884	884	210	177	144
25	204	13	.....	76	.....	42	545	884	847	210	210	144
26	192	13	.....	92	.....	30	545	872	749	221	188	129
27	192	13	.....	100	.....	.....	545	884	677	221	210	124
28	180	13	.....	96	.....	.....	545	884	641	221	199	129
29	158	13	.....	69	.....	.....	545	872	557	210	144	129
30	137	13	.....	69	.....	.....	389	872	497	221	155	129
31	137	.....	.....	69	.....	.....	.....	860	.....	221	199	.....

NOTE.—Canal dry on days for which discharge is not given.

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Monthly discharge of South San Joaquin canal near Knights Ferry, Calif., for the year Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	230	127	165	10,100
November	137	.0	47.7	2,840
December	28	.0	5.55	341
January	137	.0	55.6	3,420
February	272	.0	109	6,050
March	81	.0	19.6	1,210
April	557	.0	302	18,000
May	884	221	784	48,200
June	884	497	832	49,500
July	521	210	279	17,200
August	233	144	208	12,800
September	353	124	181	10,800
The year	884	.0	249	180,000

OAKDALE CANAL[1] NEAR KNIGHTS FERRY, CALIF.

LOCATION.—On lot 2, near northwest corner of SE. ¼ SE. ¼ sec. 10, T. 1 S., R. 12 E., 1,700 feet below head gate at Goodwin dam, on Stanislaus River, and 4 miles above Knights Ferry, Stanislaus County.

RECORDS AVAILABLE.—May 3, 1914, to September 30, 1918. Also miscellaneous measurements and rough estimates for 1913.

GAGE.—Vertical staff in well on left bank about 1,700 feet below head gate, installed April 29, 1916; gage used until April 28, 1916, was a vertical staff in well on left bank about 800 feet below head gate at a different datum. Gage read by H. A. Haywood.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Canal has trapezoidal section and sidewalls are concrete.

EXTREMES OF DISCHARGE.—1914–1918: Maximum stage recorded, 5.05 feet in May and June 1918 (discharge, 217 second-feet); no flow during periods of each year.

ACCURACY.—Stage-discharge relation changed by the repairs made in canal during the fall of 1917 when the canal was shut down. Rating curves well defined. Gage read to half-tenths feet twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—Gage-height record furnished by Oakdale irrigation district, through Burton Smith, chief engineer.

Oakdale canal diverts water from left bank of the river at Goodwin dam. The water is used for irrigation in the Oakdale irrigation district.

Discharge measurements of Oakdale canal near Knights Ferry, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 21	Charles Leidl	5.05	219
22	do	3.00	110
Aug. 1	J. F. Kunesh	2.69	97

[1] Also known as south main canal.

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Daily discharge, in second-feet, of Oakdale canal near Knights Ferry, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Feb.	Apr.	May.	June.	July.	Aug.	Sept.
1	85	.....	.....	200	206	184	95	73
2	95	.....	.....	206	206	156	90	51
3	105	.....	.....	200	206	217	95	65
4	85	.....	.....	206	211	172	95	82
5	57	11	.....	206	200	189	86	69
6	61	51	.....	206	206	134	90	65
7	61	16	.....	206	211	114	90	69
8	55	.....	.....	206	211	114	86	65
9	51	.....	.....	206	211	114	90	65
10	65	.....	.....	206	211	110	90	65
11	57	28	.....	211	217	100	90	69
12	59	45	.....	211	217	104	82	65
13	55	49	21	211	217	100	95	82
14	55	57	100	211	217	100	90	134
15	50	65	100	211	217	110	86	130
16	57	82	100	211	217	100	86	130
17	53	57	100	211	217	100	86	63
18	53	77	100	211	217	90	86	69
19	57	46	130	217	217	90	86	61
20	57	.....	145	217	217	90	86	47
21	57	.....	162	217	217	90	86	55
22	13	.....	184	217	217	95	82	57
23	.....	.....	184	217	217	90	77	55
24	.....	.....	184	217	217	82	69	53
25	.....	.....	184	217	211	82	86	53
26	.....	.....	184	217	206	86	73	47
27	.....	.....	184	217	189	86	82	49
28	.....	.....	184	211	178	90	77	49
29	.....	.....	194	206	172	86	57	49
30	.....	.....	194	206	178	90	61	51
31	.....	.....	.....	206	.....	95	82	.....

NOTE.—No flow Oct. 23, 1917 to Feb. 4, Feb. 8-10, and Feb. 23 to Apr. 12, 1918.

Monthly discharge of Oakdale canal near Knights Ferry, Calif., for the year ending Sept. 30, 1918.

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	105	0	43.3	2,660
February	82	0	20.9	1,160
April	194	0	87.8	5,220
May	217	200	210	12,900
June	217	172	208	12,400
July	217	82	112	6,890
August	95	57	84.3	5,180
September	134	47	67.9	4,040
The year	217	0	69.7	50,400

CALAVERAS RIVER AT JENNY LIND, CALIF.

LOCATION.—In SE. ¼ sec. 22, T. 3 N., R. 10 E., at highway bridge on Milton road one-fourth mile southeast of Jenny Lind, Calaveras County, and 27 miles above junction with San Joaquin River. North and South forks unite about 15 miles above station.

DRAINAGE AREA.—395 square miles.

RECORDS AVAILABLE.—January 1 to June 30, 1907; December 1, 1907, to June 30, 1908; and November 1, 1908, to September 30, 1918.

GAGE.—Vertical staff in two sections on downstream end of middle pier of bridge. Read by P. F. Sinclair. Datum lowered 5 feet October 13, 1917.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

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CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.0 feet March 12 (approximate discharge, from extension of rating curve, 28,800 second-feet); no flow in river August 6 to September 5.

1907–1918: Maximum stage recorded, 14.0 feet 7 a. m. January 31, 1911 (approximate discharge, from extension of rating curve, 69,600 second-feet); stage was higher about midnight; minimum stage, dry July 22 to November 17, 1913; October 1 to 12, 1914, August 5 to September 9, 1915, August 6 to September 5, 1917, and June 1 to September 30, 1918.

DIVERSIONS.—A small quantity of water is stored at Salt Springs Valley for use in connection with dredging operations below Jenny Lind.

ACCURACY.—Stage-discharge relation changed March 12. Rating curve before change well defined below 2,000 second-feet and is extended above; curve after change poorly defined. Gage read to tenths once daily; oftener during floods. Daily discharge ascertained by applying mean daily gage height to rating table. Records poor.

COOPERATION.—Gage-height record during the high-water season, December to June, is furnished by the United States Weather Bureau, through N. R. Taylor, meteorologist.

Discharge measurements of Calaveras River at Jenny Lind, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	J. F. Kunesh	3.43	1.3	May 9	Charles Leidl	3.60	72
Feb. 16	do	3.93	85	July 5	do		0

Daily discharge, in second-feet, of Calaveras River at Jenny Lind, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1	1.3	1.3	23	40	65	137	250	72
2	1.3	1.3	23	40	65	137	250	72
3	1.3	1.3	23	40	65	137	250	72
4	1.3	1.3	23	40	65	137	250	72
5	1.3	1.3	23	40	65	137	205	72
6	1.3	1.3	23	40	65	137	205	72
7	1.3	10	23	40	137	9,820	205	72
8	1.3	10	23	40	345	2,620	165	72
9	1.3	10	23	40	137	770	165	72
10	1.3	23	23	40	137	770	165	72
11	1.3	23	23	40	137	21,400	130	72
12	1.3	23	23	40	137	28,800	130	72
13	1.3	23	40	40	137	1,860	130	47
14	1.3	23	40	40	137	1,070	130	47
15	1.3	23	40	65	137	1,070	100	47
16	1.3	23	40	65	137	1,070	100	47
17	1.3	23	40	65	137	820	100	25
18	1.3	23	40	65	3,160	1,080	100	25
19	1.3	23	40	65	945	2,460	100	25
20	1.3	23	40	65	345	2,150	100	25
21	1.3	23	40	65	345	2,150	100	13
22	1.3	23	40	65	345	1,860	100	13
23	1.3	23	40	65	2,970	1,370	100	13
24	1.3	23	40	65	1,240	820	72	13
25	1.3	23	40	65	770	660	72	5
26	1.3	23	40	65	540	400	72	5
27	1.3	23	40	65	345	400	72	5
28	1.3	23	40	65	137	295	72	5
29	1.3	23	40	65	.....	250	72	1
30	1.3	23	40	65	.....	250	72	1
31	1.3	.....	40	65	.....	250	.....	1

NOTE.—Discharge estimated Oct. 1-11 and Apr. 30 to May 31. No flow June 1 to Sept. 30.

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Monthly discharge of Calaveras River at Jenny Lind, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 395 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	1.3	1.3	1.30	0.0033	0.004	80.0
November	23	1.3	17.4	.044	.05	1,040
December	40	23	33.4	.085	.10	2,050
January	65	40	53.7	.136	.16	3,300
Febrauary	3,160	65	473	1.20	1.25	26,300
March	28,800	137	2,750	6.96	8.02	169,000
April	250	72	134	.339	.38	7,970
May	72	1	39.6	.100	.12	2,430
The year	28,800	.0	293	.742	10.08	212,000

MOKELUMNE RIVER AND TRIBUTARIES.

NORTH FORK OF MOKELUMNE RIVER NEAR WEST POINT, CALIF.

LOCATION.—In NW. ¼ sec. 17, T. 7 N., R. 15 E., at Bruce's camp, 9½ miles northeast of West Point, on line between Calaveras and Amador counties. Blue Creek enters 1 mile below and Bear Creek 4 miles above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 28, 1917, to September 30, 1918 (incomplete).

GAGE.—Friez water-stage recorder on right bank about 500 feet below Bruce's camp; installed October 18, 1918. Previous gage was a staff gage in two sections at same site and datum.

DISCHARGE MEASUREMENTS.—Made from cable at the gage.

CHANNEL AND CONTROL.—Channel wide; bed smooth above gage, rough and steep below gage; permanent. Banks high, not subject to overflow. Zero flow, gage height 2.4 feet.

EXTREMES OF DISCHARGE.—1917–1918: Maximum stage recorded, 12.4 feet at 7.20 p. m. June 9, 1917 (discharge, 7,290 second-feet); minimum stage recorded, 3.97 feet about November 10, 1917 (date and time unknown as clock was stopped) (discharge, 44 second-feet).

DIVERSIONS.—None.

REGULATION.—Some storage in Blue Lakes is used by Pacific Gas & Electric Co. during periods of low water to augment natural flow.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Mean daily gage height determined by inspecting the recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table and interpolating for days on which gage height was not recorded except November 7–10, for which it was estimated from flow of other forks of Mokelumne River.

Discharge measurements of North Fork of Mokelumne River near West Point, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 19	4.27	77	May 13	8.03	1,640	May 17	7.87	1,490
May 12	7.64	1,360	14	8.92	2,490	18	8.16	1,690
12	7.59	1,260	14	8.23	1,870	July 2	5.48	322
13	8.49	2,020	15	8.49	2,070	3	5.10	230
13	8.15	1,720	16	7.74	1,390	3	5.10	231

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Daily discharge, in second-feet, of North Fork of Mokelumne River near West Point, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	May.	June.	July.	Aug.	Sept.
1	.....	79	93	[a]124	74	.....	2,220	248	101	89
2	.....	80	226	[a]120	.....	.....	1,690	308	108	87
3	.....	[a] 80	136	[a]116	.....	.....	1,780	224	108	86
4	.....	80	100	[a]112	.....	2,910	1,740	180	106	85
5	.....	79	86	[a]108	.....	2,800	1,780	150	105	85
6	.....	81	90	[a]104	.....	2,520	1,780	136	104	86
7	.....	[b]108	93	[a]100	.....	2,580	1,780	124	102	90
8	.....	[b] 93	88	[a] 96	.....	2,470	1,870	100	100	90
9	.....	[b] 68	81	[a] 92	.....	1,440	1,780	93	99	90
10	.....	[b] 57	[a] 83	[a] 88	.....	1,160	1,780	86	96	90
11	.....	75	[a] 84	[a] 84	.....	1,100	1,780	80	93	92
12	.....	79	86	80	.....	1,560	1,740	84	93	98
13	.....	80	90	79	.....	2,170	1,640	106	92	156
14	.....	102	88	80	.....	2,320	1,360	105	93	600
15	.....	90	94	81	.....	1,870	1,010	106	93	149
16	.....	86	98	80	.....	1,640	820	104	94	68
17	.....	88	94	81	.....	1,780	[a] 771	98	96	96
18	75	89	111	93	.....	1,640	[a] 722	93	93	118
19	75	89	121	98	.....	1,970	[a] 673	92	92	110
20	75	90	100	80	.....	2,020	[a] 625	89	94	88
21	[a]75	94	96	83	.....	2,070	[a] 576	86	99	90
22	74	90	94	78	.....	2,170	[a] 527	86	99	122
23	73	84	96	78	.....	2,220	478	85	94	132
24	72	83	94	75	.....	2,170	426	84	93	110
25	70	83	94	[a] 74	.....	1,690	362	83	92	93
26	70	83	102	74	.....	1,260	332	81	93	92
27	[a]71	80	147	70	.....	952	302	80	98	90
28	72	76	226	73	.....	898	280	74	93	105
29	75	81	136	76	.....	1,260	268	80	92	164
30	76	89	[a]132	74	.....	1,870	252	87	92	178
31	78	.....	[a]128	74	.....	2,120	.....	94	91	.....

[a] No record, discharge estimated. [b] No record, discharge interpolated.

NOTE.—No record Oct. 1-17, Feb. 2 to May 3, and July 8 to Sept. 30.

Monthly discharge of North Fork of Mokelumne River near West Point, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 18-31	78	70	73.6	2,040
November	108	57	83.9	4,990
December	226	81	109	6,700
January	124	70	87.9	5,400
May 4-31	2,910	898	1,880	104,000
June	2,220	252	1,100	65,500
July	308	74	114	7,010
August	108	91	96.5	5,930
September	600	68	121	7,200

NOTE.—No record February to April.

MOKELUMNE RIVER NEAR CLEMENTS, CALIF.

LOCATION.—In NW. ¼ sec. 15, T. 4 N., R. 8 E., at highway bridge 1 mile north of Clements, San Joaquin County. Cosumnes River enters 19½ miles below station. North and Middle forks of Mokelumne River unite 35 miles above Clements.

DRAINAGE AREA.—631 square miles.

RECORDS AVAILABLE.—October 28, 1904, to September 30, 1918.

GAGE.—Staff in four sections at bridge; No. 1 is vertical and fastened to pile on right bank; No. 2 is inclined and is directly back of No. 1; No. 3 is vertical and bolted to middle pier near downstream end; No. 4 is vertical and bolted to left abutment near downstream end. Read by Mrs. J. S. Hodges.

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DISCHARGE MEASUREMENTS.—Made from bridge at gage, or by wading.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting. Right bank is high and not subject to overflow; left bank is overflowed above stage 15 feet, for a distance of 200 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.0 feet at 5 p. m. March 12 (discharge, 8,620 second-feet); minimum stage recorded, 1.8 feet during parts of December and January (discharge, 20 second-feet).

1904–1918: Maximum stage recorded, 17.45 feet January 30, 1911 (discharge, 16,700 second-feet); minimum stage recorded, 1.8 feet part of December, 1917, and January, 1918 (discharge, 20 second-feet).

DIVERSIONS.—Several small ditches divert water for mining and irrigation above the station. Power is developed on the North Fork and part of the water is diverted outside of the drainage basin.

REGULATION.—Flow partly regulated by storage developed on the headwaters of the North Fork.

ACCURACY.—Stage-discharge relation changed February 7 and March 12. Rating curves fairly well defined. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Mokelumne River near Clements, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 11	J. F. Kunesh	2.20	67	May 9	Charles Leidl	6.51	2,510
Feb. 15	do	2.79	231	July 6	do	2.77	248
15	do	2.76	225	Aug. 1	J. F. Kunesh	2.09	64

Daily discharge, in second-feet, of Mokelumne River near Clements, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	68	76	68	36	68	255	1,870	3,040	2,150	210	48	58
2	85	76	262	30	68	255	1,870	3,360	2,290	194	58	50
3	85	76	160	36	68	291	1,590	2,960	2,150	243	48	65
4	85	85	136	36	54	272	1,320	3,540	2,290	243	48	105
5	76	76	61	36	68	330	1,200	3,920	2,360	150	42	116
6	76	76	42	36	68	395	1,200	3,120	2,430	194	42	105
7	68	105	36	36	366	2,430	1,200	3,200	2,290	150	65	105
8	68	115	36	42	515	1,730	1,320	3,120	2,290	150	50	94
9	68	95	36	42	272	1,130	1,520	2,880	2,640	226	65	58
10	68	105	30	25	221	1,000	1,870	1,940	2,290	194	65	65
11	68	105	36	25	156	2,570	2,010	1,730	2,220	150	74	94
12	68	95	36	30	140	6,940	1,870	1,590	2,220	112	84	148
13	68	125	30	36	156	2,960	2,150	2,290	2,290	101	105	148
14	68	160	42	42	204	1,660	1,800	2,430	2,080	90	94	502
15	68	105	25	36	204	1,320	1,590	2,430	1,660	68	74	580
16	76	76	25	36	172	1,060	1,590	2,150	1,320	101	105	242
17	76	85	20	36	291	940	1,730	2,290	1,200	112	74	126
18	68	76	30	68	272	1,060	2,010	2,080	1,200	124	105	160
19	68	68	54	76	221	6,160	2,010	2,150	1,060	124	65	137
20	68	76	54	76	204	2,720	2,150	2,290	940	124	116	148
21	85	85	42	76	172	1,870	2,500	2,430	820	136	126	172
22	76	85	42	76	1,320	1,590	2,800	2,290	655	58	105	148
23	76	85	36	76	815	1,460	2,800	2,500	628	112	94	126
24	85	76	20	76	1,460	1,460	2,880	2,430	505	112	105	148
25	85	68	30	68	935	1,460	2,880	2,290	482	101	116	160
26	85	76	30	68	515	1,520	2,720	2,010	416	99	58	137
27	76	68	36	68	490	2,150	2,720	1,730	354	68	58	105
28	68	61	54	61	272	1,800	2,570	1,460	315	79	105	116
29	85	61	54	68	.....	1,590	2,960	1,320	296	48	116	137
30	76	54	36	68	.....	1,590	2,880	1,460	226	68	84	94
31	76	.....	30	76	.....	1,660	.....	1,870	.....	79	58	.....

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Monthly discharge of Mokelumne River near Clements, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 631 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	85	68	74.7	0.118	0.14	4,590
November	160	54	85.8	.136	.15	5,110
December	262	20	52.5	.083	.10	3,230
January	76	25	51.5	.082	.09	3,170
February	1,460	54	349	.553	.58	19,400
March	6,940	265	1,730	2.74	3.16	106,000
April	2,960	1,200	2,050	3.25	3.63	122,000
May	3,920	1,320	2,400	3.80	4.38	148,000
June	2,640	226	1,470	2.33	2.60	87,500
July	243	48	129	.204	.24	7,930
August	126	42	79.1	.125	.14	4,860
September	580	50	148	.235	.26	8,810
The year	6,940	20	719	1.14	15.47	521,000

MIDDLE FORK OF MOKELUMNE RIVER AT WEST POINT, CALIF.

LOCATION.—In sec. 10, T. 6 N., R. 13 E., above highway bridge 1 mile south of West Point, Calaveras County, 1½ miles below mouth of Bear Creek, and 3½ miles above junction with South Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 9, 1911, to September 30, 1918.

GAGE.—Vertical staff in two sections, fastened to trees on right bank, 1,000 feet above bridge, read by C. H. Spink.

DISCHARGE MEASUREMENTS.—Made from cable one-half mile above gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.56 feet night of March 11–12 (discharge, 1,150 second-feet); minimum stage recorded, 2.42 feet August 10, 11, 22, and 23 (discharge, 1.2 second-feet).

1911–1918: Maximum stage recorded, 10.0 feet at 4 p. m. January 23, 1914 (discharge, 2,556 second-feet); minimum stage recorded, 2.42 feet August 10, 11, 22, and 23, 1918 (discharge, 1.2 second-feet).

ICE.—Stage-discharge relation may be slightly affected by ice.

DIVERSIONS.—Mokelumne Hill and Valley Springs ditch (capacity about 6 second-feet) diverts water about 2 miles above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed. Rating curve well defined below 900 second-feet and extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Middle Fork of Mokelumne River at West Point, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 13	2.64	4.3	May 11	8.88	73
15	2.59	2.8	July 4	2.73	5.3

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Daily discharge, in second-feet, of Middle Fork of Mokelumne River at West Point, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5	4.3	9.5	11	8	30	169	86	27	6	1.8	1.4
2	5	4.3	18	11	8	30	160	86	26	5.5	1.6	1.4
3	5	4.3	35	10	8	29	135	86	24	5.5	1.6	1.5
4	5	4.3	8	10	8	29	120	86	24	5	1.6	1.6
5	5	4.3	9.5	9.5	8	27	112	86	22	5	1.6	1.6
6	5	9.5	11	9	39	30	105	85	22	4.7	1.6	1.8
7	5	8	11	9	61	454	120	82	20	4.3	1.6	1.8
8	4.7	6	11	9	23	135	120	92	20	4.0	1.6	1.8
9	4.7	5	11	9	18	82	135	86	19	4.0	1.6	1.8
10	4.3	4.8	11	9	14	169	143	82	18	3.6	1.2	2.1
11	3.8	7	11	9	13	514	152	73	18	3.6	1.2	2.1
12	3.8	9	11	12	12	900	152	67	18	3.3	1.6	2.1
13	3.8	7	11	13	22	253	143	65	17	3.3	1.8	15
14	3.8	6	11	14	27	169	135	61	16	3.0	1.8	34
15	4.3	6	11	12	18	127	120	57	16	3.0	2.1	9
16	4.3	6	11	11	14	105	120	53	16	3.0	2.1	9
17	4.3	6	14	11	14	105	120	50	14	2.7	2.1	8.5
18	4.3	6	11	11	22	178	120	48	14	1.8	2.1	7
19	4.3	6	11	11	18	675	120	45	13	1.8	2.1	5
20	4.3	6	11	11	20	253	120	44	12	2.1	1.8	5
21	4.3	6	11	10	105	188	120	43	11	1.8	1.5	5.5
22	4.3	6	11	10	169	160	120	42	10	1.6	1.2	9
23	4.3	6	11	10	135	143	120	40	9	1.6	1.2	8.5
24	4.3	6	11	10	169	135	120	38	8.5	1.6	1.4	7
25	4.3	6	11	9.5	71	120	120	37	8	1.6	1.4	5
26	4.3	6	18	9.5	47	276	105	36	8	1.6	1.6	5
27	4.3	6	14	9	39	209	92	36	8	1.8	1.6	5
28	4.3	6	12	9	32	169	86	36	7.5	1.8	1.6	8
29	4.3	6	12	8.5	.....	152	86	33	7	1.8	1.8	9
30	4.3	6	11	8	.....	160	86	31	6.5	1.8	1.8	7
31	4.3	.....	11	8	.....	160	.....	29	.....	1.8	1.8	.....

Monthly discharge of Middle Fork of Mokelumne River at West Point, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	5	3.8	4.42	272
November	9.5	4.3	5.99	356
December	35	8	12.3	756
January	14	8	10.1	621
February	169	8	40.8	2,270
March	900	27	199	12,200
April	169	86	123	7,320
May	92	29	58.7	3,610
June	27	6.5	15.3	910
July	6	1.6	3.03	186
August	2.1	1.2	1.66	102
September	34	1.4	6.08	362
The year	900	1.2	40.0	29,000

SOUTH FORK OF MOKELUMNE RIVER NEAR RAILROAD FLAT, CALIF.

LOCATION.—In sec. 34, T. 6 N., R. 14 E., at Laidet ranch, 5 miles above mouth of Licking Fork, and 5 miles east of Railroad Flat, Calaveras County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 23, 1911, to September 30, 1918.

GAGE.—Vertical staff fastened to alder tree on right bank 100 feet above suspension foot bridge; read by C. M. Laidet.

DISCHARGE MEASUREMENTS.—Made from cable 150 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel; seldom shifts.

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EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.6 feet at 8.10 a. m. March 12 (discharge, 695 second-feet); minimum stage recorded, 1.18 feet at 5.10 p. m. August 22 (discharge, 2.4 second-feet).

1911–1918: Maximum stage recorded, 6.9 feet at 4.20 p. m. January 25, 1914 (discharge, 3,330 second-feet); minumum stage recorded, 1.18 feet at 5.10 p. m. August 22, 1918 (discharge, 2.4 second-feet). (A stage of 1.10 feet on November 18, 1911, gave a discharge of 4 second-feet).

ICE.—Stage-discharge relation at times slightly affected by ice, but not during year ending September 30, 1918.

DIVERSIONS.—An irrigation and power ditch of about 2 second-feet capacity, diverts at base of Blue Mountain, above station. Some water is also used for irrigation at Laidet ranch.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation changed March 12. Rating curves coincide at 2.1 feet, well defined below 600 second-feet and is extended above. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records for medium stages excellent; other records good.

Discharge measurements of South Fork of Mokelumne River near Railroad Flat, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 14	1.30	6.6
May 19	1.82	49
July 4	1.40	12

Daily discharge, in second-feet, of South Fork of Mokelumne River near Railroad Flat, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8	[a] 6.5	41	6.5	7	25	159	99	30	[a] 12	5	3.6
2	7	[a] 6.5	27	7	7	28	156	99	28	12	5	2.8
3	6.5	6.5	16	7	7	31	143	99	28	11	4.3	2.8
4	7	6.5	12	7	7	30	140	94	28	12	4.3	2.8
5	7	8	11	8	7	28	123	92	26	9.5	4.3	2.6
6	7	16	10	8	36	31	119	89	24	10	4.7	2.8
7	6.5	10	10	8	61	260	128	86	24	10	[a] 4.5	3.2
8	6.5	9	10	8	24	89	114	86	22	10	4.3	2.8
9	6.5	8	9	8	19	65	132	82	22	9	3.9	2.8
10	6.5	7	9	7	16	83	148	78	23	8	3.6	2.8
11	6	7	9	7	14	330	146	76	20	7.5	3.2	2.8
12	6	10	9	12	13	581	148	70	20	7	3.2	2.8
13	6	9.5	8.5	11	18	204	143	67	20	7	[a] 3.2	10
14	6.5	8.5	8.5	12	17	132	123	62	20	7	[a] 3.2	27
15	7	8	8.5	10	13	[a] 109	119	62	20	7	3.2	15
16	7	8	8.5	10	15	86	[a] 120	58	20	7	4.3	13
17	7	8	10	9	27	82	121	53	20	7	6	10
18	8	8	8.5	9	24	242	123	53	19	6.5	4.7	7.5
19	8	8	8	8.5	22	552	123	48	[a] 18	6.5	4.7	6
20	7	8	8	8.5	24	253	130	48	16	6.5	3.6	5
21	6.5	8	8	8	47	165	135	48	16	6	2.8	5
22	6.5	8	8	8	89	222	148	[a] 44	16	6	2.8	6
23	6.5	7	8	8	63	135	154	[a] 40	16	6.5	2.8	6.5
24	6.5	6.5	7	8	63	119	[a] 141	37	15	6.5	3.2	6.5
25	6.5	8	9	6.5	[a] 53	119	128	36	15	6.5	2.8	6.5
26	6	8	18	6.5	[a] 43	154	119	34	14	6.5	2.8	6.5
27	6	[a] 8	13	6.0	[a] 33	174	119	37	13	[a] 6	3.6	6
28	6.5	[a] 8	11	6.5	24	159	108	36	13	6	3.2	8
29	6.5	8	9.5	6.5	.....	[a] 151	103	36	13	5	3.6	8
30	6.5	8	9	7.0	.....	143	103	34	13	4.3	3.6	6.5
31	6.5	.....	8	6.0	.....	162	.....	32	.....	5	3.6	.....

[a] No gage-height record; discharge interpolated.

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Monthly discharge of South Fork of Mokelumne River near Railroad Flat, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8	6	6.69	411
November	16	6.5	8.15	485
December	41	7	11.3	695
January	12	6	8.02	493
February	89	7	28.3	1,570
March	581	25	159	9,780
April	159	103	131	7,800
May	99	32	61.8	3,800
June	30	13	19.7	1,170
July	12	4.3	7.64	470
August	6	2.8	3.81	234
September	27	2.6	6.45	384
The year	581	2.6	37.9	27,300

NORTH FORK OF COSUMNES RIVER NEAR ELDORADO, CALIF.

LOCATION.—In sec. 23, T. 9 N., R. 10 E., at suspension footbridge at Celio's ranch,[1] 4 miles above junction with Middle Fork, and 5 miles south of Eldorado, Eldorado County. Martinez Creek enters 1½ miles above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 13, 1911, to September 30, 1918.

GAGE.—Staff in three sections on right bank at the bridge, read by James Yates. A temporary gage was used August 13 to September 23, 1911; at same site datum 1.0 foot higher.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel and solid rock; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.5 feet March 12 (discharge, 3,720 second-feet); minimum stage recorded, 2.65 feet August 30 to September 3 (discharge, 1.4 second-feet).

1911–1918: Maximum stage recorded, 14.2 feet January 25, 1914 (discharge from extension of rating curve, about 6,930 second-feet); minimum stage recorded, 2.65 feet August 30 to September 3, 1918 (discharge, 1.4 second-feet)

ICE.—Stage-discharge relation very slightly, if ever, affected by ice.

DIVERSIONS.—The J. J. Crawford ditch (about 2 feet wide) diverts from Camp Creek, above the station. The water is used for irrigation below Placerville.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 3,000 second-feet and is extended above. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to discharge table. Records good.

The following discharge measurement was made by J. F. Kunesh:

October 10, 1917: Gage height, 2.98 feet; discharge, 4.8 second-feet.

[1] "Kings Store" on map of Placerville quadrangle, United States Geological Survey.

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Daily discharge, in second-feet, of North Fork of Cosumnes River near Eldorado, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.5	6	60	29	25	99	652	418	114	8	2.3	1.4
2	a 6.5	6.5	85	29	a 27	99	a 590	a 430	99	8	2.3	1.4
3	6.5	6.5	49	29	29	99	528	a 442	99	8	2.3	1.4
4	6.5	6.5	39	29	29	99	490	454	99	6.5	2.8	1.7
5	5	6.5	34	29	29	99	490	418	99	6.5	2.8	1.7
6	6	21	29	29	130	99	472	384	99	6.5	2.3	1.7
7	a 5.5	21	a 29	29	322	1,360	a 481	384	99	5	2.3	1.7
8	a 5	21	29	29	130	490	490	352	92	a 4.6	2.3	1.7
9	5	21	a 29	29	a 95	266	695	293	85	4.3	2.0	1.7
10	5	21	a 29	29	60	1,420	785	266	a 80	4.3	2.0	2.3
11	5	18	a 29	25	a 54	528	695	a 253	a 75	4.3	a 2.0	2.0
12	5	29	29	25	49	3,720	652	240	a 70	3.4	2.0	2.3
13	5	21	29	72	99	975	695	215	a 65	3.4	2.0	11
14	5	18	25	49	215	696	610	191	60	3.4	2.0	122
15	5	a 20	25	49	85	418	490	191	49	3.4	2.0	92
16	a 5	21	25	39	72	352	a 490	191	49	3.4	2.0	39
17	5	29	29	a 29	215	352	490	191	49	3.4	2.3	21
18	5	29	34	39	130	352	472	191	44	3.4	a 2.3	14
19	6	a 29	29	39	99	2,030	490	191	39	3.4	2.3	14
20	6.5	29	a 29	34	85	1,080	528	180	39	2.8	2.3	14
21	a 6	21	29	29	122	695	610	169	39	2.5	2.3	14
22	5	21	29	29	610	610	652	169	34	2.3	2.3	18
23	5	21	29	29	266	528	695	159	29	2.3	2.0	21
24	5	21	29	a 29	695	490	695	149	25	2.3	2.0	21
25	5	a 21	a 32	29	a 432	490	695	140	21	2.8	1.7	a 18
26	5	21	a 36	29	169	454	610	a 135	21	2.8	1.7	14
27	5	21	39	29	130	1,140	490	130	18	2.8	1.7	11
28	5	21	39	29	114	925	454	130	8	a 2.6	1.7	14
29	5	21	39	29	.....	695	418	149	8	2.5	1.7	18
30	5	21	34	29	.....	695	418	130	8	2.3	1.4	21
31	5	.....	29	29	.....	652	.....	130	.....	2.3	1.4	.....

a No gage-height record; discharge interpolated.

Monthly discharge of North Fork of Cosumnes River near Eldorado, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	6.5	5	5.35	329
November	29	6	19.7	1,170
December	85	25	34.2	2,100
January	72	25	32.9	2,020
February	695	25	161	8,940
March	3,720	99	710	43,700
April	785	418	567	33,700
May	454	130	241	14,800
June	114	8	57.2	3,400
July	8	2.3	3.98	245
August	2.8	1.4	2.08	128
September	122	1.4	17.3	1,030
The year	3,720	1.4	154	112,000

COSUMNES RIVER AT MICHIGAN BAR, CALIF.

LOCATION.—In NW. ¼ SE. ¼ sec. 36, T. 8 N., R. 8 E., at highway bridge at Michigan Bar, Sacramento County, 5½ miles southwest of Latrobe. North and Middle forks unite 12 miles above station.

DRAINAGE AREA.—525 square miles.

RECORDS AVAILABLE.—October 20, 1907, to September 30, 1918.

GAGE.—Vertical staff on downstream end of bridge pier, near left bank; read by C. B. Ruman.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

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CHANNEL AND CONTROL.—Sand, gravel, and small boulders; fairly permanent. Zero flow; gage height 1.4 feet ± 0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.5 feet at noon March 12 (discharge, 11,900 second-feet); no flow September 4–11.

1907–1918: Maximum stage recorded, 11.0 feet February 21, 1917 (discharge, 22,400 second-feet); minimum stage, river dry July 25 to September 16, 1908, and September 4–11, 1918.

DIVERSIONS.—Douglas and Enterprise ditches divert from the Middle and South forks and have a combined capacity of about 50 second-feet. The water is used for power, domestic supply, and irrigation at Plymouth and vicinity. Slug Gulch ditch, having a capacity of 7 or 8 second-feet, also diverts water from the Middle Fork when prior appropriations permit. Michigan Bar canal, which has a capacity of about 50 second-feet, heads on the main Cosumnes at Musicdale Creek. No record is available showing quantity of water that is diverted.

REGULATION.—Flow is partly regulated by diversions.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of Cosumnes River at Michigan Bar, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 9	2.02	6.6
Aug. 2	1.82	2.0

Daily discharge, in second-feet, of Cosumnes River at Michigan Bar, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7.5	7.5	160	39	39	210	1,160	675	210	20	2.5	0.2
2	7.5	7.5	120	39	39	210	1,160	675	192	20	2.5	.2
3	7.5	8.5	98	39	39	192	1,000	675	203	20	2.0	.1
4	7.5	9	64	39	39	192	805	635	182	14	2.0	.0
5	7.5	9	51	39	39	210	760	635	175	12	1.7	.0
6	7.5	14	44	39	64	182	760	595	175	12	1.7	.0
7	7.5	39	39	39	460	2,760	805	595	175	12	1.7	.0
8	7.5	45	39	39	345	1,340	760	525	157	12	1.7	.0
9	6.5	29	37	39	192	760	950	560	145	12	1.7	.0
10	6	29	37	39	132	2,280	1,340	460	120	9	1.7	.0
11	6	28	35	39	102	3,700	1,160	400	120	9	1.7	.0
12	6	29	34	39	98	10,800	1,160	400	120	9	1.7	.2
13	6	37	34	64	109	2,760	1,050	400	120	9	1.7	10
14	6	34	31	89	230	1,410	1,050	400	98	6	1.7	157
15	6	29	29	80	246	1,050	850	400	87	6	1.5	175
16	6	29	39	64	140	805	850	372	80	6	1.5	61
17	6	29	39	64	595	675	850	345	80	6	1.1	45
18	6	29	39	59	430	850	850	345	80	6	1.1	31
19	6	29	49	51	210	7,530	850	335	67	6	1.1	24
20	6	29	39	51	175	2,760	850	295	64	6	1.1	20
21	9	29	39	51	295	1,620	950	295	58	6	1.1	20
22	9	29	39	49	1,860	1,340	850	295	58	4.6	1.5	15
23	9	29	39	51	1,410	1,160	850	295	51	3.3	1.5	14
24	7.5	29	39	51	1,550	1,050	850	250	51	3.3	1.7	17
25	7.5	29	39	51	675	1,000	850	250	51	3.3	1.7	20
26	7.5	29	41	51	430	1,000	718	250	39	3.3	1.5	20
27	7.5	29	58	39	320	2,190	675	250	29	3.3	1.5	20
28	7.5	29	64	39	230	1,480	675	250	29	3.3	1.2	20
29	7.5	29	58	39	.....	1,220	675	234	22	3.0	.5	24
30	7.5	51	45	39	.....	1,160	718	210	20	2.5	.5	29
31	7.5	.....	39	39	.....	1,160	.....	210	.....	2.5	.5	.....

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Monthly discharge of Cosumnes River at Michigan Bar, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9	6	7.08	435
November	51	7.5	27.0	1,610
December	160	29	50.2	3,090
January	89	39	48.0	2,950
February	1,860	39	375	20,800
March	10,800	182	1,780	109,000
April	1,340	675	894	53,200
May	675	210	404	24,800
June	210	20	102	6,070
July	20	2.5	8.08	497
August	2.5	.5	1.50	92.2
September	175	.0	24.1	1,430
The year	10,800	.0	310	225,000

GOOSE LAKE BASIN.

DREWS CREEK RESERVOIR NEAR LAKEVIEW, OREG.

LOCATION.—Dam is in sec. 5, T. 40 S., R. 18 E.; reservoir extends upstream about 10 miles.

RECORDS AVAILABLE.—February 26, 1913, to September 30, 1918; occasional readings until February 6, 1916; after that date readings practically every day.

GAGE.—Gage face attached to plank on upstream face of dam since 1915. Previous readings obtained by measuring down from the floor of gate house. Gage heights refer to a datum level with lowest contour of reservoir. Gage reader, James McShane.

OUTLETS.—A tunnel with sill at elevation 16.3 feet and a blow-out pipe in center of dam at bottom.

EXTREMES OF STAGE.—Maximum stage recorded during year, 45.0 feet April 21 to 27 (quantity stored, 27,400 acre-feet); minimum stage recorded, 30.8 feet Sept. 29–30 (quantity stored, 3,970 acre-feet).

1913–1918: Maximum stage recorded, 53.4 feet April 18 to 20, 1914 (quantity stored, 55,500 acre-feet.

ACCURACY.—Prior to 1914 the monthly estimates of increase or decrease of volume of storage are only approximate, as the readings of water stage are very rough, but the error for the entire year is probably not great. Beginning in 1914 the results are good.

The following readings, at the end of each month, have been used in correcting the observed flow of Drews Creek below the dam:

Readings used in correcting observed flow of Drews Creek below dam.

Date.	Gage height (feet).	Storage (acre-feet).	Loss or gain during month (acre-feet).	Date.	Gage height (feet).	Storage (acre-feet).	Loss or gain during month (acre-feet).
Oct. 31	38.00	12,300	−1,190	Apr. 30	44.90	27,140	+4,960
Nov. 30	37.70	11,830	− 470	May 31	43.40	23,300	−3,840
Dec. 31	37.80	11,990	+ 160	June 30	39.78	15,400	−7,900
Jan. 31	38.20	12,640	+ 650	July 31	35.62	8,820	−6,580
Feb. 28	38.80	13,860	+1,220	Aug. 31	32.50	5,340	−3,480
Mar. 31	42.95	22,180	+8,320	Sept. 30	30.80	3,970	−1,370

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DREWS CREEK NEAR LAKEVIEW, OREG.

LOCATION.—In SE. ¼ sec. 4, T. 40 S., R. 18 E., at highway bridge half a mile below mouth of Willow Creek, 1 mile below Drews Creek dam, and 18 miles southwest of Lakeview, Lake County.

DRAINAGE AREA.—211 square miles.

RECORDS AVAILABLE.—January 16, 1909, to September 30, 1918.

GAGE.—Friez water-stage recorder on right bank, 100 yards upstream from highway bridge; installed May 18, 1918. Recorder on left bank just below bridge used March 19, 1912, to May 17, 1918, referred to a vertical staff on the highway bridge, installed March 1, 1910. Gage inspected by James McShane. Inclined staff at station No. 1, at the dam site a mile above present gage, used January 16 to May 31, 1909, and vertical staff at station No. 2, at a dump-car bridge 100 feet below the dam site, November 20, 1909, to February 28, 1910.

DISCHARGE MEASUREMENTS.—Made from wagon bridge or by wading.

CHANNEL AND CONTROL.—Control about 150 feet below gage; rock and practically permanent; bed composed of gravel and sand, shifts slightly; drift and growth of aquatic plants may collect on control occasionally, affecting stage-discharge relation. One channel at all stages. Willows on right bank.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder at new site, 0.83 foot at 6 p. m. June 19 (discharge, 20 second-feet); minimum stage, from water-stage recorder, 0.44 foot September 16–28 (discharge 1.0 second-feet); discharge may have gone a little lower than this during the winter.

1900–1917: Maximum stage recorded, 8.3 feet January 16, 1909, on original gage (discharge, 2,730 second-feet). Gage height estimated as 12 to 13 feet on gage No. 2 (gage washed out) on evenings of March 1 and 2, 1910 (discharge probably about 3,000 second-feet). Creek dry at times prior to construction of reservoir.

ICE.—Stage-discharge relation affiected by ice during the coldest weather, generally for one to two months.

DIVERSIONS.—The North Drews canal of the Goose Lake Valley Irrigation Co. diverts water past the station; record is kept of its discharge and this is added to secure the total run-off from the creek..

REGULATION.—Since the last part of 1912, water has been stored in the reservoir of the Goose Lake Valley Irrigation Co. just above the station. A neglible quantity of water was stored prior to that time.

The run-off records when corrected for storage are often negative during the summer as the discharge into the reservoir becomes too small to offset the evaporation losses.

ACCURACY.—Stage-discharge relation unstable at old site used up to May 19; much better but apparently affected by growth of aquatic plants at new site. Two fairly well defined rating curves used for May 20 to 29 and June 12 to September 30; shifting-control method May 30 to June 11. Operation of recorder satisfactory only part of time; one staff gage reading daily, used balance of year gives satisfactory results. Daily discharge ascertained by applying to rating table the mean daily gage height obtained from the daily gage reading or by inspecting the recorder graph.. Discharge for October 1 to May 19, obtained from weir data furnished by Goose Lake Valley Irrigation Co. Record fair April to July, poor during the rest of year; but owing to the small quantities involved the accuracy of determination of the total run-off, including North Drews canal, is not seriously affected.

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Discharge measurements of Drews Creek near Lakeview, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 27	F. F. Henshaw	2.00	7.7	June 16	R. C. Briggs	0.58	6.1
May 20	R. C. Briggs	a.56	6.8	Aug. 5	do	.50	2.5

a On new gage: old gage read 1.96 feet.

Daily discharge, in second-feet, of Drews Creek near Lakeview, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		6	8	6	10	2.5	2.0
2		6	8	8	12	2.5	2.0
3		6	8	8	12	2.5	2.0
4		6	8	8	12	2.5	2.0
5		6	8	8	12	2.5	2.0
6		6	8	8	12	2.5	2.0
7		6	8	8	12	2.5	1.5
8		6	8	8	14	2.5	1.5
9		6	8	8	12	2.5	1.5
10		7	8	10	10	2.5	1.5
11		7	8	10	10	2.5	1.5
12		7	7	12	10	2.5	1.5
13		7	7	12	10	2.5	1.5
14		7	7	11	10	2.5	1.5
15		7	7	9	10	2.5	1.5
16		7	7	7	14	2.5	1.0
17		7	7	6	12	2.5	1.0
18		8	7	6	12	2.5	1.0
19		8	7	15	12	2.5	1.0
20		8	7	14	12	2.5	1.0
21		8	8	12	14	2.5	1.0
22		8	10	10	14	2.5	1.0
23		8	7	10	14	2.5	1.0
24	3	8	7	9	13	2.5	1.0
25	3	8	7	7.5	5.5	2.0	1.0
26	3	8	7	6.0	13	2.0	1.0
27	3	8	7	5.5	8.5	2.0	1.0
28	4	8	10	5.5	3.3	2.0	1.0
29	4	8	24	5.5	2.5	2.0	1.2
30	4	8	16	5.5	2.5	2.0	1.2
31	5		16		2.5	2.0	

NOTE.—Mean discharge estimated from records on weirs maintained by the Goose Lake Valley Irrigation Co. below the dam as follows: Oct. 1–10, 2.5 second-feet; Oct. 11–31, 2.0 second-feet; Nov. 1–10, 1.5 second-feet; Nov. 11 to February 4, 1.0 second-feet; Feb. 5, 1.5 second-feet; Feb. 6, 3.0 second-feet; Feb. 7 to Mar. 15, 1.5 second-feet, Mar. 16–23, 2.0 second-feet; Mar. 24 to May 19, as in table.

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Monthly discharge of Drews Creek near Lakeview, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October			2.2	135
November			1.2	71
December			1.0	61
January			1.0	61
February			1.5	83
March	5		2.2	135
April	8	6	7.13	424
May	24	7	8.71	536
June	15	5.5	8.62	513
July	14	2.5	10.4	640
August	2.5	2.0	2.39	147
September	2.0	1.0	1.36	81
The year	24		3.98	2,890

NOTE.—Total run-off of Drews Creek, including North Drews canal and allowing for decrease in storage in reservoir during year, was 13,800 acre-feet.

NORTH DREWS CANAL NEAR LAKEVIEW, OREG.

LOCATION.—In SE. ¼ sec. 4, T. 40 S., R. 18 E., nearly opposite station on Drews Creek, 1½ miles below intake of canal at Drews Creek dam and 18 miles southwest of Lakeview, Lake County.

RECORDS AVAILABLE.—March 18, 1914, to September 30, 1918.

GAGE.—Vertical staff on right side of canal opposite bridge, on Drews Creek; installed May 20, 1918. A gage in flume at station 107, about half a mile below, was used from 1914 to May 19, 1918. Gage reader, James McShane.

DISCHARGE MEASUREMENTS.—Made from wagon bridge one-fourth mile above gage or by wading.

CHANNEL AND CONTROL.—Canal excavated in earth and rock; control is a rock cut, a few hundred feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and during period 1914 to 1918, 3.52 feet June 16–18 (discharge, 143 second-feet). Canal dry at times.

ACCURACY.—Stage-discharge relation practically permanent at new station, unstable at old station, owing to growth of aquatic plants. Fairly well defined rating curve used for old gage April 23 to May 19, shifting-control method used October to December. Curve for new gage is well defined; Gage read to half-tenths daily thereafter. Daily discharge ascertained by applying daily gage heights to rating table. Results for new gage excellent, for old gage fair.

North Drews canal diverts water from Drews Creek at reservoir dam in SE. ¼ sec. 5 for irrigating land north of the creek on the west side of Goose Lake Valley.

Discharge measurements of North Drews canal near Lakeview, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 27	Henshaw and Briggs	0.92	20.6	June 16	R. C. Briggs	3.51	144
[illegible]	R. C. Briggs	[a] 2.22	56	Aug. 5	do	2.18	51.4

[a] On new gage, old gage read 1.90 feet.

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Daily discharge, in second-feet, of North Drews canal near Lakeview, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	29	14	16	.....	23	75	111	37	35
2	29	14	16	.....	32	75	111	37	26
3	29	14	16	.....	32	75	111	53	26
4	29	14	16	.....	32	75	111	50	26
5	29	14	16	.....	32	75	111	50	26
6	29	14	.....	.....	32	75	111	50	26
7	14	14	.....	.....	32	75	111	50	26
8	14	14	.....	.....	32	75	111	50	26
9	14	14	.....	.....	23	75	111	50	26
10	14	14	.....	.....	23	75	90	50	26
11	14	14	.....	.....	23	75	82	50	26
12	14	14	.....	.....	23	75	82	50	26
13	14	14	.....	.....	40	119	82	43	26
14	14	14	.....	.....	46	127	82	43	26
15	14	14	.....	.....	46	127	75	43	26
16	14	14	.....	.....	46	143	82	43	14
17	14	14	.....	.....	46	143	75	43	14
18	14	14	.....	.....	46	143	75	43	14
19	14	14	.....	.....	46	83	68	43	14
20	14	14	.....	.....	53	75	58	46	14
21	14	14	.....	.....	69	75	58	46	14
22	14	14	.....	.....	56	103	53	53	14
23	14	14	.....	32	50	103	53	53	14
24	14	14	.....	17	50	127	39	53	14
25	14	14	.....	23	56	143	39	50	14
26	14	14	.....	23	69	143	72	50	14
27	14	14	.....	22	69	143	82	50	14
28	14	14	.....	22	69	143	63	50	14
29	14	14	.....	22	69	160	53	50	14
30	14	14	.....	22	69	160	53	39	14
31	14	.....	.....	.....	75	.....	37	39	.....

Monthly discharge of North Drews canal near Lakeview, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	29	14	16.9	1,040
November	14	14	14.0	833
December 1-5	.....	.....	16.0	159
April 23-30	.....	.....	2.29	363
May	75	23	45.5	2,800
June	160	75	105	6,250
July	111	37	79.1	4,860
August	53	37	47.0	2,890
September	35	14	20.3	1,210
The year	.....	.....	.....	20,400

NOTE.—Canal dry Dec. 6 to Apr. 22.

COTTONWOOD CREEK NEAR LAKEVIEW, OREG.

LOCATION.—In SW. ¼ sec. 29, T. 38 S., R. 19 E., half a mile below dam site of proposed storage reservoir, near edge of valley, and 10 miles northwest of Lakeview, Lake County.

DRAINAGE AREA.—30 square miles.

RECORDS AVAILABLE.—November 22, 1908, to September 30, 1918.

GAGE.—Vertical staff on left bank; read once daily by Peter Segner. From November 22, 1908, to January 18, 1909, a gage just above a weir, one-fourth mile below the dam site, was used.

DISCHARGE MEASUREMENTS.—Made from a footbridge 40 feet below present gage or by wading near gage.

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CHANNEL AND CONTROL.—Bed composed of clean gravel; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.9 feet March 25 (discharge, 139 second-feet); minimum stage recorded, 0.05 foot August 31 to September 3 (discharge, 0.2 second-feet).

1908–1918: Maximum stage recorded, 3.4 feet November 23, 1909 (discharge, 337 second-feet); minimum discharge, that of 1918.

ICE.—Stage-discharge relation seriously affected by ice during February; flow estimated.

DIVERSIONS.—Some water diverted during 1918 for irrigation in a valley above the station.

ACCURACY.—Stage-discharge relation for stages below 0.7 foot, changed during high water about March 25; rating curve for first period well defined, for second period poorly defined at low-water gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Records good for October to December, April and May, poor during the rest of the year on account of diurnal fluctuation and uncertainty of rating.

Discharge measurements of Cottonwood Creek near Lakeview, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 13	Hardman and Henderson [a]	0.32	5.6
Apr. 27	F. F. Henshaw	.73	31.2
June 16	R. C. Briggs	.26	2.9

[a] Employees of Goose Lake Valley Irrigation Co.

Daily discharge, in second-feet, of Cottonwood Creek near Lakeview, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.7	6.5	14.0	4.6	16.0	43.0	28.0	7.0	1.2	1.2	.2
2	2.7	6.5	16.0	4.6	19.0	39.0	32.0	7.0	1.2	1.2	.2
3	2.7	6.5	16.0	4.6	16.0	39.0	28.0	7.0	1.2	1.2	.2
4	2.7	6.5	16,0	6.5	16.0	35.0	28.0	7.0	1.2	1.2	.5
5	2.7	6.5	19.0	6.5	14.0	28.0	32.0	7.0	1.2	1.2	.5
6	2.7	6.5	16.0	6.5	14.0	24.0	28.0	7.0	1.2	1.2	.5
7	2.7	6.5	16.0	6.5	16.0	21.0	28.0	7.0	1.2	1.2	.5
8	2.7	4.6	16.0	6.5	16.0	43.0	21.0	7.0	1.2	1.2	.5
9	2.7	4.6	16.0	11.0	19.0	87.0	21.0	7.0	1.2	1.2	.5
10	2.7	4.6	14.0	11.0	16.0	74.0	21.0	5.0	1.2	1.2	1.2
11	2.7	6.5	14.0	19.0	11.0	69.0	18.0	5.0	2.0	1.2	1.2
12	2.7	6.5	6.5	22.0	8.8	47.0	18.0	5.0	2.0	1.2	1.2
13	2.7	6.5	6.5	22.0	6.5	43.0	18.0	5.0	2.0	2.0	2.0
14	2.7	8.8	6.5	16.0	6.8	35.0	15.0	5.0	2.0	2.0	2.0
15	4.6	8.8	4.6	11.0	11.0	35.0	15.0	5.0	2.0	2.0	2.0
16	4.6	8.8	4.6	11.0	14.0	32.0	15.0	5.0	2.0	2.0	2.0
17	4.6	11.0	6.5	11.0	14.0	28.0	15.0	5.0	2.0	2.0	2.0
18	4.6	11.0	6.5	14.0	16.0	28.0	15.0	5.0	2.0	2.0	2.0
19	4.6	11.0	6.5	16.0	19.0	35.0	15.0	3.5	2.0	2.0	2.0
20	4.6	11.0	6.5	16.0	87.0	43.0	15.0	3.5	2.0	2.0	2.0
21	4.6	14.0	6.5	14.0	92.0	43.0	12.0	3.5	2.0	2.0	2.0
22	4.6	14.0	8.8	14.0	97.0	43.0	12.0	3.5	2.0	2.0	2.0
23	4.6	11.0	8.8	11.0	97.0	35.0	9.0	3.5	2.0	2.0	2.0
24	4.6	11.0	8.8	11.0	102.0	39.0	9.0	3.5	2.0	2.0	2.0
25	2.7	11.0	8.8	14.0	139.0	35.0	9.0	3.5	2.0	2.0	2.0
26	2.7	11.0	8.8	16.0	97.0	35.0	9.0	3.5	2.0	1.2	2.0
27	2.7	11.0	8.8	16.0	102.0	32.0	9.0	2.0	2.0	1.2	3.5
28	2.7	14.0	6.5	14.0	102.0	28.0	9.0	1.2	2.0	.5	2.0
29	4.6	14.0	6.5	11.0	43.0	32.0	9.0	1.2	2.0	.5	2.0
30	6.5	14.0	6.5	11.0	69.0	32.0	9.0	1.2	1.2	.5	2.0
31	6.5	.....	6.5	14.0	60.0	.....	9.0	.....	1.2	.2	.....

NOTE.—Stage-discharge affected by ice during February; discharge estimated, 10 second-feet.

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Monthly discharge of Cottonwood Creek near Lakeview, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	6.5	2.7	3.62	223
November	14	4.6	9.14	544
December	19	4.6	10.1	621
January	22	4.6	12.0	738
February	.....	.....	a10.0	555
March	139	6.5	43.8	2,690
April	87	21	39.4	2,340
May	32	9.0	17.1	1,051
June	7.0	1.2	4.72	281
July	2.0	1.2	1.69	104
August	2.0	.2	1.44	89
September	3.5	.2	1.49	89
The year	139	.2	12.9	9,320

a Estimated.

SACRAMENTO RIVER BASIN.

MAIN STREAM.

SACRAMENTO RIVER AT CASTELLA, CALIF.

LOCATION.—In sec. 22, T. 38 N., R. 4 W., at private highway bridge at Castella, Shasta County, half a mile below mouth of Castle Creek.

DRAINAGE AREA.—257 square miles.

RECORDS AVAILABLE.—October 15, 1910, to April 20, 1918, when station was discontinued.

GAGE.—Vertical staff on downstream end of bridge pier near right bank; read by A. H. Smythe.

DISCHARGE MEASUREMENTS.—Made from bridge at Sweetbrier camp, half a mile below gage, the section being more satisfactory than the one at the highway bridge where early measurements were made.

CHANNEL AND CONTROL.—Small boulders; rough; fairly permanent.

EXTREMES OF DISCHARGE.—1910–1918: Maximum stage recorded, 13.7 feet at 5.50 a. m. January 2, 1914 (discharge, from extension of rating curve, about 16,000 second-feet); minimum stage recorded, 2.05 feet September 19 to 30, 1917 (discharge, 108 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 3,500 second-feet and is extended above. Gage read to tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by A. H. Smythe.

The following discharge measurement was made by J. F. Kunesh:

September 17, 1918: gage-height, 2.20 feet; discharge, 164 second-feet.

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Daily discharge, in second-feet, of Sacramento River at Castella, Calif., for the period Feb. 12 to Apr. 20, 1918.

Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.	Day.	Feb.	Mar.	Apr.
1	.....	440	1,260	11	.....	485	1,260	21	350	1,260	.....
2	.....	485	800	12	485	590	1,260	22	440	1,260	.....
3	.....	485	800	13	485	485	1,060	23	590	1,260	.....
4	.....	485	800	14	395	440	800	24	485	1,260	.....
5	.....	440	720	15	395	485	800	25	440	1,260	.....
6	.....	440	800	16	395	485	800	26	440	1,260	.....
7	.....	440	800	17	395	1,260	800	27	440	1,060	.....
8	.....	440	1,260	18	395	4,860	800	28	440	1,060	.....
9	.....	440	1,260	19	310	2,150	800	29	.....	880	.....
10	.....	440	1,260	20	310	1,260	800	30	.....	1,260	.....
								31	.....	1,260	.....

NOTE.—Gage not read Oct. 1 to Feb. 11.

Monthly discharge of Sacramento River at Castella, Calif., for the period Feb. 12 to Apr. 20, 1918.

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
February 12-28	590	310	423	.....	.....	14,300
March	4,860	440	971	3.78	4.36	59,700
April 1-20	1,260	720	947	.....	.....	37,600
The year	.....	.....	.....	.....	.....	112,000

SACRAMENTO RIVER NEAR RED BLUFF, CALIF.

LOCATION.—In lot 4, sec. 34, T. 28 N., R. 3 W., at lower end of Iron Canyon, 3 miles below proposed Iron Canyon dam site and 4 miles northeast of Red Bluff, Tehama County. Paines Creek enters 3 miles above and Antelope Creek 7 miles below station.

DRAINAGE AREA.—9,300 square miles, not including the drainage area of Goose Lake—1,090 square miles—which belongs naturally in Pit River basin but has contributed no water except for a short time in 1869, and for more than two hours during a severe storm from the north in 1881, when the lake overflowed to North Fork of Pit River. Previously published figures of discharge in second-feet per square mile and run-off in depth in inches, based on the drainage area including Goose Lake, should be used with caution because of the large noncontributing area.

RECORDS AVAILABLE.—January 28, 1902, to September 30, 1918. In 1879 the State engineer and in 1893 and 1894 the commissioner of public works made measurements at this point. From April 30, 1895, to June 30, 1902, a gaging station was maintained at Jellys Ferry, 12 miles above Red Bluff.

GAGE.—Staff in seven sections on left bank; read by Richard Groebe. Several gages have been used at this station, but all observations have been reduced to the present datum. The United States Weather Bureau gage at Red Bluff has occasionally been used for short periods.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet above the gage.

CHANNEL AND CONTROL.—Coarse gravel and small boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.8 feet at 8.40 a. m., March 19 (discharge, 54,400 second-feet); minimum stage recorded, 0.6 foot August 30 to September 2 (discharge, 3,510 second-feet).

1902-1918: Maximum stage recorded, 35.2 feet February 3, 1909 (discharge, 278,000 second-feet); minimum stage recorded, 0.6 foot August 30 to September 2, 1918 (discharge, 3,510 second-feet).

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DIVERSIONS.—The Anderson-Cottonwood canal diverts from the Sacramento River at Redding. This canal started to divert water in 1918. A small amount of water is diverted from some of the minor tributaries for irrigation.

REGULATION.—No storage of any importance has been developed in the drainage area above the station.

ACCURACY.—Stage-discharge relation permament. Rating curve well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of Sacramento River near Red Bluff, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 22	0.70	3,690
July 22	.70	3.700

Daily discharge, in second-feet, of Sacramento River near Red Bluff, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,490	4,490	15,100	6,350	5,370	8,600	17,000	8,300	5,140	4,080	3,690	3,510
2	4,490	4,490	8,000	6,090	5,370	8,300	15,500	8,000	5,140	3,880	3,690	3,510
3	4,490	4,700	6,350	5,840	5,370	8,300	14,000	7,710	5,140	3,880	3,690	3,510
4	4,280	5,140	5,840	5,840	5,370	8,000	12,900	7,710	5,140	3,880	3,690	3,510
5	4,280	5,140	5,600	5,600	5,840	8,910	12,200	7,710	4,920	3,880	3,690	3,510
6	4,280	5,370	5,370	5,600	14,400	7,710	11,500	7,430	4,920	3,880	3,690	3,690
7	4,280	5,140	5,370	5,600	28,500	8,000	11,500	7,150	4,700	3,880	3,690	3,690
8	4,280	4,920	5,370	5,600	16,200	8,600	12,200	7,150	4,700	3,880	3,690	3,880
9	4,280	4,920	5,140	5,370	12,200	8,600	19,000	7,150	4,700	3,880	3,690	3,880
10	4,280	4,920	5,140	5,370	9,540	8,300	22,300	7,150	4,700	3,880	3,690	3,880
11	4,280	4,920	5,140	5,370	8,300	17,000	18,200	7,150	4,700	3,880	3,690	3,880
12	4,280	6,610	5,140	5,600	7,710	18,200	16,600	6,880	4,700	3,880	3,510	3,880
13	4,280	5,840	5,140	5,600	8,600	18,200	16,600	6,610	4,700	3,880	3,690	4,280
14	4,280	5,600	5,140	7,150	8,910	13,300	14,800	6,610	4,490	3,880	3,690	12,900
15	4,280	5,370	5,140	7,150	8,300	11,500	14,400	6,350	4,490	3,880	3,690	6,090
16	4,280	5,140	5,140	6,350	7,710	10,900	12,200	6,350	4,490	3,880	3,880	4,920
17	4,280	4,920	5,140	6,090	11,500	10,500	11,500	6,350	4,490	3,690	3,880	4,490
18	4,280	4,920	5,140	6,090	9,540	25,400	11,200	6,090	4,490	3,690	3,880	4,280
19	4,490	4,920	5,140	6,350	8,300	52,100	10,900	6,090	4,490	3,690	3,880	4,280
20	4,490	4,920	5,140	6,090	7,710	29,400	10,500	6,090	4,280	3,690	3,880	4,280
21	4,490	4,920	5,140	5,840	7,710	22,300	10,200	6,090	4,280	3,690	3,880	4,280
22	4,490	4,920	5,140	5,600	8,910	18,600	10,500	6,090	4,280	3,690	3,880	4,280
23	4,490	4,920	5,140	5,600	12,200	19,000	10,200	5,840	4,280	3,690	3,880	4,490
24	4,490	4,920	5,140	5,600	19,800	19,400	10,200	5,600	4,280	3,690	3,690	4,490
25	4,490	4,920	6,500	5,600	14,400	24,900	10,200	5,600	4,280	3,690	3,690	4,280
26	4,490	4,920	12,900	5,600	11,500	31,800	9,540	5,600	4,280	3,690	3,690	4,280
27	4,490	4,920	17,000	5,370	9,860	25,800	9,220	5,600	4,280	3,690	3,510	4,280
28	4,490	4,920	10,200	5,370	9,220	22,300	8,910	5,370	4,280	3,690	3,510	4,280
29	4,490	5,140	8,300	5,370	.....	20,600	8,600	5,370	4,080	3,690	3,510	4,490
30	4,490	6,350	7,150	5,370	.....	19,400	8,300	5,370	4,080	3,690	3,510	4,490
31	4,490	.....	6,610	5,370	.....	17,800	.....	5,140	.....	3,690	3,510	.....

NOTE.—Gage not read Dec. 14-25; discharge estimated from record of flow of Pit River near Ydalpom.

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Monthly discharge of Sacramento River near Red Bluff, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4,490	4,280	4,390	270,000
November	6,610	4,490	5,110	304,000
December	17,000	5,140	6,710	412,000
January	7,150	5,370	5,800	357,000
February	28,500	5,370	10,300	572,000
March	52,100	7,710	17,200	1,060,000
April	22,300	8,300	12,700	756,000
May	8,300	5,140	6,510	400,000
June	5,140	4,080	4,560	271,000
July	4,080	3,690	3,790	233,000
August	3,880	3,510	3,700	228,000
September	12,900	3,510	4,450	265,000
The year	52,100	3,510	7,080	5,130,000

PIT RIVER AND TRIBUTARIES.

PIT RIVER AT HENDERSON, CALIF.

LOCATION.—In sec. 36, T. 37 N., R. 1 W., at Big Bend ferry, one-fourth mile above Henderson, Shasta County. Nelson Creek enters half a mile above and Kosk Creek 1 mile below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 28, 1910, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder 50 feet below vertical staff fastened to an alder tree on left bank about 100 feet above ferry; the gages do not read exactly the same on account of the slope of the water surface. Staff gage is the original gage. From December 28, 1912, to September 21, 1917, record is from a Gurley printing water-stage recorder. Original datum has been maintained.

DISCHARGE MEASUREMENTS.—Made from cable 25 feet downstream from water-stage recorder.

CHANNEL AND CONTROL.—Rough; boulders and coarse gravel; fairly permanent. One channel at all stages; banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.6 feet at 3 a. m. March 27 (discharge, 6,400 second-feet); minimum stage from water-stage recorder, 0.43 foot during afternoon September 4 (discharge, 2,190 second-feet).

1910–1918: Maximum stage from water-stage recorder, 5.39 feet at 8 p. m. April 25, 1917 (discharge, 13,600 second-feet); minimum stage from water-stage recorder 0.43 foot afternoon of September 4, 1918 (discharge, 2,190 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—No information.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Mean daily gage height determined by inspecting the recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

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Discharge measurements of Pit River at Henderson, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 24	0.50	2,270
25	.50	2,310

Daily discharge, in second-feet, of Pit River at Henderson, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,590	2,750	3,100	2,750	2,590	2,920	4,450	2,920	2,440	2,290	2,290	2,290
2	2,590	2,750	2,920	2,750	2,750	2,920	4,250	2,920	2,440	2,290	2,290	2,220
3	2,590	2,750	2,920	2,750	2,750	2,920	4,050	2,750	2,440	2,220	2,290	2,220
4	2,590	2,750	2,920	2,750	2,750	2,920	3,660	2,750	2,440	2,290	2,290	2,220
5	2,590	2,750	2,750	2,750	2,750	2,920	3,660	2,750	2,440	2,440	2,290	2,220
6	2,590	2,750	2,750	2,750	3,100	2,920	3,470	2,750	2,440	2,440	2,290	2,290
7	2,590	2,750	2,750	2,750	3,280	2,920	3,470	2,750	2,440	2,290	2,290	2,290
8	2,590	2,750	2,750	2,750	3,280	2,920	3,470	2,590	2,440	2,440	2,290	2,290
9	2,590	2,750	2,750	2,750	3,100	2,920	3,850	2,590	2,290	2,440	2,290	2,290
10	2,590	2,750	2,750	2,750	3,100	3,100	4,050	2,590	2,290	2,290	2,290	2,290
11	2,590	2,920	2,750	2,750	2,920	3,280	3,850	2,750	2,440	2,440	2,290	2,290
12	2,590	2,750	2,750	2,750	2,920	3,470	3,850	2,750	2,440	2,440	2,290	2,440
13	2,590	2,750	2,750	2,750	2,920	3,470	3,850	2,750	2,440	2,440	2,290	2,440
14	2,590	2,750	2,750	2,750	3,100	3,660	3,850	2,750	2,440	2,440	2,290	2,590
15	2,590	2,750	2,750	2,750	2,920	3,280	3,660	2,750	2,440	2,440	2,290	2,440
16	2,590	2,750	2,750	2,750	3,100	3,280	3,470	2,750	2,290	2,440	2,440	2,440
17	2,590	2,750	2,750	2,750	2,920	3,470	3,470	2,750	2,290	2,290	2,440	2,440
18	2,590	2,750	2,750	2,750	2,920	3,850	3,280	2,750	2,440	2,290	2,440	2,590
19	2,590	2,750	2,920	2,750	2,920	4,050	3,280	2,750	2,440	2,220	2,440	2,590
20	2,590	2,750	2,920	2,750	2,920	4,250	3,280	2,590	2,440	2,220	2,290	2,590
21	2,590	2,750	2,920	2,750	2,750	4,250	3,100	2,590	2,440	2,220	2,290	2,590
22	2,590	2,750	2,920	2,750	2,920	4,660	3,100	2,590	2,440	2,290	2,290	2,590
23	2,750	2,750	2,920	2,750	3,100	4,660	3,100	2,590	2,440	2,290	2,290	2,590
24	2,590	2,750	2,920	2,750	3,100	4,450	3,100	2,590	2,440	2,290	2,290	2,590
25	2,750	2,750	2,920	2,750	3,100	4,870	3,100	2,440	2,440	2,290	2,290	2,590
26	2,750	2,750	3,100	2,750	3,100	5,720	3,100	2,440	2,290	2,290	2,290	2,590
27	2,750	2,750	2,920	2,750	3,100	6,170	3,100	2,590	2,290	2,290	2,290	2,590
28	2,750	2,920	2,920	2,750	2,920	5,940	3,100	2,590	2,290	2,290	2,290	2,440
29	2,750	3,100	2,920	2,750	.....	5,500	2,920	2,590	2,290	2,290	2,290	2,440
30	2,750	3,100	2,920	2,750	.....	5,080	2,920	2,590	2,290	2,220	2,290	2,440
31	2,750	.....	2,920	2,750	.....	4,870	.....	2,590	.....	2,290	2,290	.....

NOTE.—No gage-height record Oct. 6–12 and May 12–17; discharge interpolated.

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Monthly discharge of Pit River at Henderson, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2,750	2,590	2,630	162,000
November	3,100	2,750	2,780	165,000
December	3,100	2,750	2,850	175,000
January	2,750	2,750	2,750	169,000
February	3,280	2,590	2,970	165,000
March	6,170	2,920	3,920	241,000
April	4,450	2,920	3,500	208,000
May	2,920	2,440	2,670	164,000
June	2,440	2,290	2,400	143,000
July	2,440	2,220	2,330	143,000
August	2,440	2,290	2,310	142,000
September	2,590	2,220	2,430	145,000
The year	6,170	2,220	2,790	2,020,000

PIT RIVER AT YDALPOM, CALIF.

LOCATION.—In NW. ¼ sec. 32, T. 34 N., R. 3 W., at Silverthorne Ferry, 1½ miles southwest of Ydalpom, Shasta County, and 7½ miles above junction with Sacramento River. Squaw Creek enters half a mile above and McCloud River 4 miles below station.

DRAINAGE AREA.[1]—5,260 square miles, not including drainage area of Goose Lake.

RECORDS AVAILABLE.—November 16, 1910, to September 30, 1918.

GAGE.—Vertical staff in two sections fastened to an ash tree on left bank 350 feet below ferry; read by M. D. Rodrigue.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet above ferry cable.

CHANNEL AND CONTROL.—Gravel and sand; appear permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.8 feet at 8 a. m. March 25 (discharge, 15,000 second-feet); minimum stage recorded, 2.52 feet at 11.30 a. m. July 23 (discharge, 2,410 second-feet).

1910–1918: Maximum stage recorded, 18.2 feet December 31, 1913 (discharge, from extension of rating curve, about 47,000 second-feet); minimum stage recorded, 2.52 feet at 11.30 a. m. July 23, 1918 (discharge, 2,410 second-feet).

DIVERSIONS.—A small quantity of water, used for irrigation, is diverted from the main stream and tributaries above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 35,000 second-feet and extended above. Gage read to tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records excellent.

Discharge measurements of Pit River at Ydalpom, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 23	Charles Leidl	2.52	2,460
Sept. 18	J. F. Kunesh	2.68	2,590

[1] See drainage area of Sacramento River near Red Bluff.

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Daily discharge, in second-feet, of Pit River at Ydalpom, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,780	2,780	5,480	3,540	3,230	5,480	6,000	4,180	2,780	2,510	2,450	2,450
2	2,780	2,780	4,660	3,540	3,230	5,310	6,000	4,020	2,780	2,510	2,450	2,450
3	2,780	2,780	4,340	3.540	3,230	5,480	5,650	4,020	2,780	2,510	2,450	2,450
4	2,780	2,930	4,020	3,540	3,230	5,650	5,480	4,020	2,780	2,510	2,450	2,450
5	2,780	2,930	3,700	3,540	4,980	6,650	5,310	4,020	2,640	2,510	2,450	2,450
6	2,780	2,930	3,230	3,540	7,120	5,820	5,310	4,020	2,640	2,510	2,450	2,450
7	2,780	2,930	3,080	3,380	6,360	6,000	5,140	4,020	2,640	2,510	2,450	2,450
8	2,780	2,930	3,080	3,380	5,480	6,180	5,140	3,860	2,640	2,510	2,450	2,450
9	2,780	2,930	3,080	3,380	4,820	6,360	5,140	3,860	2,640	2,510	2,450	2,450
10	2,780	2,930	3,080	3,380	4,500	6,360	4,980	3,700	2,510	2,510	2,450	2,450
11	2,780	2,930	3,080	3,380	4,500	7,320	4,980	3,700	2,510	2,510	2,450	2,450
12	2,780	3,080	3,080	3,380	4,340	6,550	4,980	3,700	2,510	2,450	2,450	2,640
13	2,780	3,080	3,080	3,380	4,180	6,000	4,820	3,700	2,510	2,450	2,450	3,700
14	2,780	3,080	3,080	3,380	4,020	5,480	4,820	3,700	2,510	2,450	2,450	3,080
15	2,780	3,080	3,080	3,380	3,860	5,480	4,980	3,540	2,510	2,450	2,450	3,080
16	2,780	3,080	3,080	3,230	3,860	5,310	4,980	3,540	2,510	2,450	2,450	2,930
17	2,780	3,080	3,080	3,230	3,860	7,920	4,660	3,540	2,510	2,450	2,450	2,780
18	2,780	3,080	3,080	3,230	3,860	12,700	4,660	3,380	2,510	2,450	2,450	2,640
19	2,780	3,080	3,080	3,230	3,700	11,700	4,660	3,380	2,510	2,450	2,450	2,510
20	2,780	3,080	3,080	3,230	3,700	10,100	4,660	3,380	2,510	2,450	2,450	2,510
21	2,780	3,080	3,080	3,230	3,860	8,540	4,660	3,380	2,510	2,450	2,450	2,510
22	2,780	3,080	3,080	3,230	6,550	9,610	4,500	3,230	2,510	2,450	2,450	2,510
23	2,780	3,080	3,080	3,230	7,320	8,750	4,500	3,230	2,510	2,450	2,450	2,510
24	2,780	3,080	3,080	3,230	6,550	10,800	4,340	3,080	2,510	2,450	2,450	2,510
25	2,780	3,080	4,340	3,230	6,360	15,000	4,340	3,080	2,510	2,510	2,450	2,510
26	2,780	3,080	8,120	3,230	6,000	11,700	4,340	3,080	2,510	2,450	2,450	2,510
27	2,780	3,080	4,820	3,230	6,000	10,500	4,340	2,930	2,510	2,450	2,450	2,510
28	2,780	3,080	4,020	3,230	5,820	9,170	4,340	2,930	2,510	2,450	2,450	2,510
29	2,780	4,340	3,700	3,230	.....	8,120	4,340	2,780	2,510	2,450	2,450	2,510
30	2,780	4,660	3,700	3,230	.....	7,320	4,180	2,780	2,510	2,450	2,450	2,510
31	2,780	.....	3,540	3,230	.....	6,360	.....	2,780	.....	2,450	2,450	.....

Monthly discharge of Pit Creek at Ydalpom, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 5,360 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	2,780	2,780	2,780	0.529	0.61	171,000
November	4,660	2,780	3,100	.589	.66	184,000
December	8,120	3,080	3,650	.694	.80	224,000
January	3,540	3,230	3,330	.633	.73	206,000
February	7,320	3,230	4,800	.913	.95	267,000
March	12,700	5,310	7,830	1.49	1.72	481,000
April	6,000	4,180	4,870	.926	1.03	290,000
May	4,180	2,780	3,500	.665	.77	215,000
June	2,780	2,510	2,570	.489	.55	153,000
July	2,510	2,450	2,470	.470	.54	152,000
August	2,450	2,450	2,450	.466	.54	151,000
September	3,700	2,450	2,600	.494	.55	155,000
The year	12,700	2,450	3,660	.696	9.45	2,650,000

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PINE CREEK NEAR ALTURAS, CALIF.

LOCATION.—In SE. ¼ SW. ¼ sec. 35, T. 42 N., R. 13 E., at Alturas Electric Light & Power Co.'s power house, 6 miles above mouth of creek and 9 miles southeast of Alturas, Modoc County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 27 to September 30, 1918.

GAGE.—Vertical staff fastened to wall of machine shop on left bank, 30 feet below discharge pipe of power plant; read by I. W. Gibbins.

DISCHARGE MEASUREMENTS.—Made by wading or from a footbridge above gage.

CHANNEL AND CONTROL.—Large irregular boulders and gravel; rough; permanent. Left bank is a sloping stone wall; right bank slopes gradually. Channel straight above and below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.65 feet at 7.30 a. m. June 15 (discharge, 26 second-feet); minimum stage recorded 1.40 feet several days in June (discharge, 15 second-feet).

DIVERSIONS.—The Alturas Electric Light & Power Co. diverts water above the gage and returns it 30 feet above the gage.

REGULATION.—Diurnal fluctuation caused by operation of power plant just above gage.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 30 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Pine Creek near Alturas, Calif., during the period May 27 to Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 27	Kunesh and Baker	1.60	24
June 26	J. F. Kunesh	1.40	15

Daily discharge, in second-feet, of Pine Creek near Alturas, Calif., for the period May 27 to Sept. 30, 1918.

Day.	May.	June.	Day.	May.	June.	Day.	May.	June.
1		18	11		23	21		21
2		15	12		23	22		19
3		17	13		23	23		15
4		17	14		25	24		19
5		19	15		25	25		18
6		21	16		23	26		15
7		19	17		24	27	24	15
8		20	18		24	28	24	15
9		20	19		24	29	23	15
10		23	20		23	30	22	15
						31	24	

NOTE.—Record started May 27; no record July 1 to Sept. 30.

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Monthly discharge of Pine Creek near Alturas, Calif., for the period May 27 to Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 27-31	24	22	23.4	232
June	25	15	19.8	1,180

McCLOUD RIVER AT BAIRD, CALIF.

LOCATION.—In NW. ¼ sec. 23, T. 34 N., R. 4 W., at United States fishery at Baird, Shasta County, 2 miles above junction with Pit River. Bailey Creek enters 2,000 feet above and Johns Creek 2,000 feet below station.

DRAINAGE AREA.—665 square miles.

RECORDS AVAILABLE.—December 22, 1910, to September 30, 1918.

GAGE.—Vertical staff fastened to an alder tree on right bank, 600 feet above the hatchery; read by employees of United States fishery.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet above gage.

CHANNEL AND CONTROL.—Gravel and cobblestones; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.35 feet at noon March 19 (discharge, 11,000 second-feet); minimum stage recorded, 1.34 feet September 10 and 11 (discharge, 910 second-feet).

1910-1918: Maximum stage recorded, 14.3 feet at noon February 2, 1917 (discharge, 27,600 second-feet); minimum stage recorded, 1.34 feet September 10 and 11, 1918 (discharge, 910 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by W. K. Hancock, superintendent of the United States fishery.

Discharge measurements of McCloud River at Baird, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 23	Charles Leidl	1.42	980
Sept. 18	J. F. Kunesh	1.37	942

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Daily discharge, in second-feet, of McCloud River at Baird, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,080	1,080	2,190	1,340	1,080	1,570	2 810	1,650	1,140	1,020	965	965
2	1,080	1,080	2,090	1,270	1,080	1,490	2,700	1,650	1,140	1,020	965	965
3	1,080	1,080	1,270	1,200	1,080	1,490	2,490	1,650	1,140	1,020	965	965
4	1,080	1,080	1,200	1,200	1,080	1,490	2,290	1,570	1,140	1,020	965	965
5	1,080	1,080	1,200	1,200	1,340	1,490	2,190	1,570	1,140	1,020	965	965
6	1,080	1,080	1,140	1,200	3,730	1,490	2,090	1,570	1,140	1,020	965	965
7	1,080	1,080	1,140	1,200	4,680	1,490	2,000	1,490	1,140	1,020	965	965
8	1,080	1,080	1,140	1,140	2,920	1,490	2,000	1,490	1,140	1,020	965	965
9	1,980	1,080	1,140	1,140	2,290	1,490	4,260	1,490	1,140	1,020	965	965
10	1,080	1,080	1,080	1,140	2,000	1,490	3,730	1,490	1,080	965	965	910
11	1,080	1,080	1,080	1,140	1,730	1,650	3,250	1,410	1,080	965	965	910
12	1,080	1,270	1,080	1,140	1,650	2,190	2,920	1,410	1,080	965	965	965
13	1,080	1,140	1,080	1,140	1,650	2,190	2,700	1,410	1,080	965	965	965
14	1,080	1,080	1,080	1,200	1,650	2,000	2,490	1,340	1,080	965	965	1,080
15	1,080	1,080	1,080	1,200	1,650	1,820	2,290	1,340	1,080	965	965	1,020
16	1,080	1,080	1,080	1,200	1,650	1,730	2,190	1,340	1,080	965	965	965
17	1,080	1,080	1,080	1,200	1,570	1,730	2,690	1,340	1,080	965	965	965
18	1,800	1,080	1,080	1,270	1,490	5,110	2,090	1,340	1,080	965	965	965
19	1,080	1,080	1,080	1,200	1,490	11,000	2,000	1,340	1,080	965	965	965
20	1,080	1,080	1,080	1,200	1,490	5,410	1,910	1,340	1,080	965	965	965
21	1,080	1,080	1,080	1,200	1,410	3,860	1,910	1,270	1,080	965	965	965
22	1,080	1,080	1,080	1,140	1,410	3,490	1,910	1,270	1,080	965	965	965
23	1,080	1,080	1,080	1,140	1,650	3,610	1,910	1,270	1,020	965	965	965
24	1,080	1,080	1,080	1,140	2,490	3,490	1,910	1,200	1,020	965	965	965
25	1,080	1,080	1,080	1,140	2,190	4,400	1,820	1,200	1,020	965	965	965
26	1,080	1,080	2,190	1,140	2,000	5,260	1,820	1,200	1,020	965	965	965
27	1,080	1,080	2,290	1,140	1,730	4,820	1,820	1,200	1,020	965	965	965
28	1,080	1,080	2,290	1,080	1,650	3,860	1,730	1,200	1,020	965	965	965
29	1,080	1,080	1,410	1,080	.....	3,370	1,650	1,200	1,020	965	965	965
30	1,080	1,820	1,340	1,080	.....	3,140	1,650	1,140	1,020	965	965	965
31	1,080	.....	1,340	1,080	.....	3,030	.....	1,140	.....	965	965	.....

Monthly discharge of McCloud River at Baird, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 665 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	1,080	1,080	1,080	1.62	1.87	66,400
November	1,820	1,080	1,110	1.67	1.86	66,000
December	2,290	1,080	1,310	1.97	2.27	80,500
January	1,340	1,080	1,170	1.76	2.03	71,900
February	4,680	1,080	1,850	2.78	2.90	103,000
March	11,000	1,490	2,970	4.47	5.15	183,000
April	4,260	1,650	2,290	3.44	3.84	136,000
May	1,650	1,140	1,370	2.06	2.38	84,200
June	1,140	1,020	1,080	1.62	1.81	64,300
July	1,020	965	981	1.48	1.71	60,300
August	965	965	965	1.45	1.67	59,300
September	1,080	910	967	1.45	1.62	57,500
The year	11,000	910	1,430	2.15	29.11	1,030,000

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LITTLE STONY CREEK BASIN.

LITTLE STONY CREEK NEAR LODOGA, CALIF.

LOCATION.—At East Park reservoir, 4 miles above junction with Stony Creek and 3½ miles northwest of Lodoga, Colusa County.

DRAINAGE AREA.—102 square miles.

RECORDS AVAILABLE.—January 1, 1908 to September 30, 1918; only discharge measurements in 1907.

GAGE.—Record beginning December 1, 1910, is from gage at the dam; prior to that date gage was a short distance below present site. Gage read by J. J. Lea.

DISCHARGE.—Computed from gage readings at the dam. Correction made for evaporation, which is measured by evaporation pan at reservoir. When discharge is 10 second-feet or less it is computed from weir and current-meter measurements taken at the head of the reservoir about 3 miles above the dam.

EXTREMES OF DISCHARGE.—1907-1918: Maximum stage reported, 11.8 feet February 2, 1909 (discharge, 7,060 second-feet); minimum stage, no flow during parts of every year.

DIVERSIONS.—No information.

REGULATION.—East Park reservoir is used for storage for the Orland project of the United States Reclamation Service.

COOPERATION.—Daily-discharge record furnished by United States Reclamation Service, through A. N. Burch, project manager.

Daily discharge, in second-feet, of Little Stony Creek near Lodoga, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	Sept.
1	2.0	1.0	1.0	5.5	7.5	71	92	30	6.0	.....
2	2.0	1.0	1.0	5.5	9	56	71	30	5.5	.....
3	2.0	1.0	1.0	5.5	9.5	68	98	36	5.0	.....
4	2.0	1.0	1.0	5.5	7.5	79	104	33	5.0	.....
5	2.0	1.0	1.0	5.5	9.5	71	96	45	4.0	.....
6	2.0	1.0	1.0	1.5	70	70	100	27	4.0	.....
7	2.0	1.0	1.0	1.0	181	48	58	32	3.0	.....
8	2.0	1.0	1.0	1.0	70	92	76	20	3.0	.....
9	2.0	1.0	1.0	1.0	29	70	52	25	3.0	.....
10	2.0	1.0	1.0	1.0	20	47	78	50	3.0	.....
11	2.0	1.0	1.0	1.0	29	152	77	60	2.0	.....
12	2.0	1.0	1.0	1.0	24	241	58	40	2.0	22
13	2.0	1.0	1.0	5.0	23	120	73	12	2.0	33
14	2.0	1.0	1.0	7.5	18	106	84	12	2.0	17
15	2.0	1.0	1.0	7.5	16	94	70	12	2.0	3.0
16	2.0	1.0	1.0	7.5	12	67	82	12	2.0	4.0
17	2.0	1.0	1.0	7.5	74	45	86	11	2.0	5.0
18	2.0	1.0	1.0	7.5	92	100	71	11	2.0	3.0
19	2.0	1.0	1.0	8	30	375	14	10	1.0	3.0
20	2.0	1.0	1.0	10	78	188	38	10	1.0	4.0
21	2.0	1.0	1.0	10	105	137	104	10	.5	3.0
22	2.0	1.0	1.0	10	344	147	84	9	.5	1.0
23	2.0	1.0	1.0	10	265	54	38	9	.5	.....
24	2.0	1.0	1.0	10	284	142	35	8	.5	.....
25	2.0	1.0	12	10	103	157	35	8	.5	.....
26	2.0	1.0	12	7	121	184	30	7	.5	.....
27	2.0	1.0	68	3.3	60	60	70	7	.5	.....
28	2.0	1.0	20	3.3	50	121	48	7	.5	.....
29	2.0	1.0	8	3.3	.....	136	35	7	.5	.....
30	2.0	1.0	7.5	3.3	.....	101	25	6	.5	.....
31	2.0	.....	5.0	3.3	.....	128	.....	5.5	.....	.....

NOTE.—No flow July 1 to Sept. 11 and Sept. 23-30.

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Monthly discharge of Little Stony Creek near Lodoga, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	2.0	2.0	2.00	0.020	0.02	123
November	1.0	1.0	1.00	.010	.01	59.5
December	68	1.0	5.05	.050	.06	311
January	10	1.0	5.45	.053	.06	335
February	344	7.5	76.5	.750	.78	4,250
March	375	45	114	1.12	1.29	7,010
April	104	25	66.1	.648	.72	3,930
May	45	5.5	19.4	.190	.22	1,190
June	6	.5	2.15	.021	.02	128
September	33	.0	3.27	.032	.04	195
The year	375	.0	24.2	.237	3.22	17,500

FEATHER RIVER AND TRIBUTARIES.

NORTH FORK OF FEATHER RIVER NEAR PRATTVILLE, CALIF.

LOCATION.—In sec. 28, T. 27 N., R. 8 E., below Great Western Power Co.'s dam at Lake Almanar (Big Meadows), 4 miles above mouth of Butt Creek and 5 miles southeast of Prattville, Plumas County.

DRAINAGE AREA.—506 square miles above dam site.

RECORDS AVAILABLE.—June 13, 1905, to September 30, 1918.

GAGE.—Vertical staff in flume about 500 feet below dam. Original gage was a Friez water-stage recorder nearly on south line of sec. 21 (above the dam); it was moved downstream about 1,300 feet April 29, 1912, and again about 2,200 feet downstream July 31, 1912. The Friez recorder was discontinued March 21, 1914, when the station was moved to present site. Original datum has not been maintained.

DISCHARGE MEASUREMENTS.—Made in flume at gage.

CHANNEL AND CONTROL.—No information.

EXTREMES OF DISCHARGE.—1905–1918: Maximum stage recorded, 16.2 feet, crest of flood, March 19, 1907 (discharge, 10,000 second-feet); minimum stage, dry April 15 and 16, 1914 (water being stored).

DIVERSIONS.—No information.

REGULATION.—Since March 7, 1914, the record shows quantity of water released from Lake Almanar reservoir. There were 135,000 acre-feet of water in reservoir September 30, 1917; and 133,000 acre-feet September 30, 1918.

COOPERATION.—Record of discharge and storage furnished by Great Western Power Co., through P. W. Ham, chief engineer.

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Daily discharge, in second feet, of North Fork of Feather River near Prattville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,000	1,790	708	1,130	680	500	75	100	100	700	1,150	900
2	2,110	1,790	400	1,130	670	472	75	100	100	700	1,220	988
3	2,080	1,720	1,270	1,180	670	381	75	100	100	700	971	1,100
4	2,080	1,630	1,250	1,180	665	420	100	100	100	700	1,110	1,050
5	2,070	1,720	1,220	1,080	660	250	100	100	100	700	1,080	1,050
6	1,930	1,610	1,190	943	334	359	100	100	100	700	1,150	1,000
7	1,780	1,900	1,180	889	200	294	100	100	100	817	1,120	800
8	1,920	1,900	1,150	848	155	300	100	100	100	900	1,120	992
9	2,020	1,800	1,110	830	142	300	100	100	100	979	1,120	1,060
10	2,200	1,800	1,080	815	183	253	100	100	177	1,040	812	1,050
11	2,000	1,560	1,170	800	571	100	100	100	362	1,010	1,130	800
12	2,020	1,600	1,510	617	600	100	100	100	400	1,050	1,150	809
13	2,060	1,560	1,490	800	600	100	100	100	400	746	1,150	588
14	1,750	1,560	1,450	790	600	100	100	100	400	850	1,150	438
15	2,020	1,700	1,340	790	600	100	100	100	400	850	1,120	800
16	2,020	1,670	1,180	780	469	100	100	100	700	813	1,020	950
17	2,000	1,510	1,230	780	100	100	100	100	600	800	800	871
18	2,000	1,350	1,180	780	560	100	100	100	525	800	1,000	871
19	2,040	1,500	1,120	770	600	100	100	100	471	675	1,100	1,000
20	1,890	1,600	1,060	760	600	100	100	100	452	600	1,070	959
21	1,790	1,530	985	755	538	100	100	100	500	750	1,290	700
22	1,980	1,480	831	740	384	100	100	100	500	871	1,090	900
23	1,990	1,440	698	725	277	100	100	100	550	1,030	1,220	950
24	1,990	1,380	880	720	100	100	100	100	550	1,110	1,000	892
25	1,990	1,130	697	720	121	100	100	100	672	781	1,150	650
26	2,000	1,320	270	720	200	100	100	100	700	975	1,200	583
27	1,950	1,290	200	690	368	75	100	100	700	712	1,390	483
28	1,740	1,210	584	690	500	75	100	100	700	1,100	1,300	304
29	1,890	1,120	883	690	.....	75	100	100	700	1,040	1,480	375
30	1,790	1,190	946	685	.....	75	100	100	700	1,180	1,410	607
31	1,790	.....	1,160	680	.....	75	.....	100	.....	1,140	979	.....

Monthly discharge of North Fork of Feather River near Prattville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.				Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	Mean stored in reservoir.[a]	
October	2,200	1,740	1,960	−1,030	121,000
November	1,900	1,120	1,550	− 620	92,200
December	1,510	200	1,010	− 230	62,100
January	1,180	617	821	− 161	50,500
February	680	100	434	+ 351	24,100
March	500	75	178	+ 812	10,900
April	100	75	97.5	+1,290	5,800
May	100	100	100	+ 911	6,150
June	700	100	402	+ 100	23,900
July	1,180	600	865	− 498	53,200
August	1,480	800	1,130	− 720	69,500
September	1,100	304	817	− 210	48,600
The year	2,200	75	784	.....	568,000

[a] The discharge in this column added to that in the column of "Means" gives the estimated unregulated discharge.

NOTE.—This table, except monthly "Mean stored in reservoir," computed by engineers of U. S. Geological Survey.

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NORTH FORK OF FEATHER RIVER AT BIG BAR, CALIF.

LOCATION.—In NW. ¼ sec. 32, T. 23 N., 5 E., one-fourth mile above Big Bar station on Western Pacific Railroad, Butte County, and about 7 miles above intake of Great Western Power Co.'s power plant at Big Bend.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 24, 1911, to September 30, 1918.

GAGE.—Bristol water-stage recorder. Original gage was a staff installed July, 1910, opposite the middle of Jesse Moore Bar. Station was moved 300 feet upstream, January 17, 1911, and the Bristol water-stage recorder was installed; gage datum, 1,347.96 feet above sea level (United States Geological Survey datum). In November, 1912, the Bristol gage was moved upstream 130 feet; gage datum now 1,348.96 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet above gage.

CHANNEL AND CONTROL.—Solid rock, boulders and gravel; practically permanent.

EXTREMES OF DISCHARGE.—1911-1918: Maximum mean daily discharge, 35,000 second-feet January 1, 1914; minimum mean daily discharge, 825 second-feet June 10, 1918.

DIVERSION.—No information.

REGULATION.—Flow partly regulated by storage in Lake Almanar.

COOPERATION.—Daily-discharge record furnished by Great Western Power Co., through P. W. Ham, chief engineer.

Daily discharge, in second-feet, of North Fork of Feather River at Big Bar, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,250	2,130	2,800	1,870	1,250	1,750	5,500	3,200	1,170	1,180	1,560	1,220
2	2,300	2,160	1,400	1,890	1,250	1,580	5,140	3,160	1,060	1,120	1,560	1,200
3	2,320	2,190	2,080	1,700	1,230	1,810	4,330	3,090	1,110	1,140	1,550	1,320
4	2,280	2,170	1,940	1,930	1,250	2,120	3,520	3,200	1,060	1,220	1,320	1,370
5	2,250	2,170	1,890	1,730	1,500	1,860	3,110	2,980	1,000	1,110	1,320	1,340
6	2,210	2,100	1,860	1,650	6,460	1,530	2,970	2,760	982	1,060	1,550	1,350
7	2,030	2,220	1,770	1,630	3,380	1,720	3,080	2,620	963	1,040	1,370	1,260
8	2,110	2,250	1,700	1,600	2,500	1,630	3,130	2,560	949	1,240	1,440	1,120
9	2,180	2,120	1,680	1,570	1,890	1,530	6,480	2,680	887	1,270	1,440	1,250
10	2,300	2,100	1,680	1,470	1,560	1,590	7,700	2,450	825	1,370	1,340	1,390
11	2,230	2,080	1,600	1,410	1,700	2,190	6,300	2,220	859	1,520	1,170	1,380
12	2,130	2,110	2,000	1,480	1,860	3,220	5,560	2,190	1,070	1,500	1,520	1,300
13	2,130	2,030	2,080	1,390	1,990	2,540	5,010	2,200	1,090	1,510	1,540	1,730
14	2,120	2,030	1,970	1,570	2,050	2,170	4,190	2,170	1,080	1,200	1,540	1,620
15	2,150	2,030	1,940	1,490	1,810	1,940	3,770	2,020	1,070	1,420	1,500	1,090
16	2,200	2,030	1,820	1,430	2,010	1,960	3,540	1,850	1,090	1,340	1,410	1,470
17	2,220	2,030	1,890	1,420	1,710	1,720	3,520	1,790	1,470	1,310	1,440	1,410
18	2,170	1,880	1,850	1,540	1,520	4,320	3,500	1,730	1,550	1,310	1,130	1,310
19	2,170	1,700	1,770	1,520	2,170	5,650	3,430	1,710	1,240	1,270	1,340	1,350
20	2,190	2,070	1,670	1,440	2,030	3,880	3,530	1,720	1,060	1,150	1,570	1,380
21	2,210	2,150	1,550	1,400	2,030	3,300	3,790	1,640	1,100	1,020	1,460	1,300
22	2,220	2,080	1,490	1,380	1,930	3,140	4,160	1,550	1,180	1,180	1,730	1,110
23	2,220	2,020	1,190	1,380	2,520	3,140	4,320	1,500	1,200	1,370	1,400	1,400
24	2,210	1,960	1,480	1,360	2,480	3,160	4,210	1,450	1,240	1,630	1,460	1,500
25	2,300	1,840	1,470	1,360	2,160	6,300	3,920	1,380	1,250	1,550	1,340	1,390
26	2,280	1,850	3,190	1,360	1,900	10,900	3,630	1,350	1,360	1,440	1,500	1,190
27	2,210	1,900	2,470	1,300	1,850	9,340	3,340	1,350	1,300	1,400	1,690	1,130
28	2,100	1,870	1,470	1,300	2,120	6,240	3,150	1,300	1,270	1,210	1,730	1,130
29	2,100	1,810	1,780	1,300	.....	5,240	3,140	1,250	1,170	1,440	1,690	1,280
30	2,130	2,360	1,750	1,300	.....	5,150	3,200	1,200	1,170	1,550	1,850	1,240
31	2,140	.....	1,940	1,280	.....	5,410	.....	1,180	.....	1,650	1,690	.....

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Monthly discharge of North Fork of Feather River at Big Bar, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2,320	2,030	2,200	135,000
November	2,360	1,700	2,050	122,000
December	3,190	1,190	1,840	113,000
January	1,930	1,280	1,500	92,200
February	6,460	1,230	2,080	116,000
March	10,900	1,530	3,490	215,000
April	7,700	2,970	4,140	246,000
May	3,200	1,180	2,050	126,000
June	1,550	825	1,130	67,200
July	1,650	1,040	1,310	80,500
August	1,850	1,130	1,490	91,600
September	1,730	1,090	1,320	78,500
The year	10,900	825	2,050	1,480,000

FEATHER RIVER AT OROVILLE, CALIF.

LOCATION.—In sec. 8, T. 19 N., R. 4 E., at highway bridge at Oroville, Butte County, 6 miles below junction of north and middle forks, and 30 miles above mouth of Yuba River.

DRAINAGE AREA.—3,640 square miles.

RECORDS AVAILABLE.—January 1, 1902, to September 30, 1918.

GAGE.—Friez water-stage recorder, installed December 16, 1912, on right bank 200 feet below bridge, at same datum as United States Weather Bureau vertical staff which is in two sections on pier of highway bridge near right bank. Weather Bureau gage was used 1902 to 1905, by adding 2 feet to the readings to reduce them to the datum of the United States Geological Survey staff gage installed on left bank about 1,000 feet above the bridge in December, 1905. The latter gage was washed out several times and, until repaired, the Weather Bureau gage was used.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above bridge. At extreme low water measurements have been made from a boat about 1,000 feet below the bridge.

CHANNEL AND CONTROL.—Boulders and gravel; shift somewhat during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 9.83 feet at 10 a. m. March 26 (discharge, 38,000 second-feet); minimum stage from water-stage recorder, 0.06 foot at 10 a. m. September 9 (discharge, 912 second-feet).

1902–1918: Maximum stage recorded, 30.2 feet on Weather Bureau gage; 39.3 feet on gage 1,000 feet above, March 19, 1907 (discharge, 187,000 second-feet) minimum stage from water-stage recorder, −0.13 foot at 10 a. m. October 7, 1913 (discharge, 790 second-feet).

DIVERSIONS.—Minor diversions from tributaries above the station.

STORAGE.—See North Fork of Feather River near Prattville, Calif.

REGULATION.—The operation of the Big Bend plant of the Great Western Power Co., causes diurnal fluctuations in stage, especially during extreme low water, when it amounts to about a foot.

ACCURACY.—Stage-discharge relation changed March 25. Rating curves well defined above 1,000 second-feet. Operation of water-stage recorder satisfactory throughout the year. Daily discharge October 1 to March 16 ascertained with a discharge integrator; March 17 to September 30 by applying mean daily gage height to the rating table except February 6, 7, March 18, 25, and April 9, when hourly discharge was averaged. Records excellent.

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Discharge measurements of Feather River at Oroville, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 5	4.96	6,950	July 20	0.21	1,020
5	4.90	6,880	20	.20	1,010
July 20	1.03	1,620			

Daily discharge, in second-feet, of Feather River at Oroville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,180	2,120	4,650	2,090	1,570	2,530	14,600	7,400	2,450	1,540	1,760	1,420
2	2,150	2,100	2,730	2,200	1,500	2,630	13,500	7,400	2,300	1,500	1,760	1,340
3	2,200	2,060	2,050	2,090	1,470	2,630	11,000	7,110	2,400	1,580	1,680	1,460
4	2,130	2,110	2,350	2,220	1,530	2,820	9,000	7,400	2,300	1,460	1,460	1,500
5	2,180	2,260	2,210	2,100	1,800	2,760	7,700	7,110	2,150	1,500	1,680	1,500
6	2,210	2,680	2,140	1,930	15,100	2,420	7,110	6,340	2,100	1,420	1,630	1,540
7	1,950	2,360	2,050	1,900	8,660	3,150	7,400	6,110	2,050	1,460	1,580	1,580
8	2,180	2,280	1,980	1,810	4,850	3,250	7,400	6,110	2,000	1,540	1,630	1,260
9	2,220	2,320	1,940	1,730	3,500	2,850	16,700	5,890	1,810	1,580	1,630	1,340
10	2,210	2,240	1,910	1,740	2,800	3,140	22,000	5,320	1,860	1,630	1,630	1,500
11	2,220	2,130	1,880	1,700	2,700	5,300	18,100	5,020	1,720	1,760	1,420	1,500
12	2,210	2,440	1,930	1,900	2,880	6,020	15,800	4,760	1,900	1,760	1,540	1,580
13	2,220	2,410	1,980	1,600	2,950	4,980	13,500	5,020	1,900	1,680	1,630	2,660
14	1,950	2,320	2,030	1,970	3,220	4,050	10,500	4,760	1,900	1,420	1,630	2,780
15	2,210	2,210	2,080	1,800	2,900	3,320	9,350	4,500	1,810	1,540	1,580	2,000
16	2,220	2,250	2,130	1,850	2,600	3,350	8,330	4,110	1,630	1,580	1,680	1,900
17	2,180	2,200	2,170	1,810	3,470	3,130	8,330	3,990	1,950	1,540	1,630	1,810
18	2,160	1,920	2,040	1,930	2,570	11,000	8,330	3,990	2,250	1,460	1,340	1,680
19	2,190	2,120	1,970	1,970	2,700	18,100	8,330	3,750	1,760	1,460	1,540	1,680
20	2,170	2,000	1,880	1,780	2,550	9,580	8,330	3,750	1,680	1,380	1,580	1,680
21	2,010	2,180	1,800	1,760	2,550	7,190	9,000	3,630	1,630	1,180	1,630	1,580
22	2,270	2,100	1,600	1,600	3,200	6,630	9,720	3,510	1,540	1,380	1,720	1,420
23	2,220	2,100	1,550	1,600	4,000	6,630	10,500	3,390	1,540	1,630	1,680	1,630
24	2,210	2,050	1,650	1,700	4,200	6,630	9,720	3,270	1,680	1,630	1,680	1,630
25	2,210	1,880	1,720	1,660	3,460	16,600	9,000	3,160	1,630	1,720	1,420	1,460
26	2,240	1,980	4,450	1,600	2,720	35,000	8,330	3,000	1,630	1,720	1,580	1,380
27	2,170	1,940	5,560	1,460	2,630	30,500	7,400	2,880	1,630	1,680	1,680	1,340
28	2,050	2,000	2,800	1,600	2,550	19,900	6,840	2,880	1,580	1,420	1,810	1,260
29	2,150	1,880	2,370	1,550	.....	15,800	7,110	2,660	1,630	1,680	1,860	1,630
30	2,130	1,990	2,370	1,490	.....	15,200	7,110	2,500	1,500	1,710	1,860	1,580
31	2,130	.....	2,250	1,500	.....	15,200	.....	2,610	.....	1,680	1,810	.....

NOTE.—No gage-height record Dec. 12–16; discharge interpolated.

Monthly discharge of Feather River at Oroville, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 3,640 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	2,270	1,950	2,170	0.596	0.69	133,000
November	2,680	1,880	2,150	.591	.66	128,000
December	5,560	1,550	2,330	.640	.74	143,000
January	2,220	1,460	1,790	.492	.56	110,000
February	15,100	1,470	3,450	.948	.99	192,000
March	35,000	2,420	8,780	2.69	3.10	540,000
April	22,000	6,840	10,300	2.83	3.16	613,000
May	7,400	2,500	4,620	1.27	1.46	284,000
June	2,450	1,500	1,860	.511	.57	111,000
July	1,760	1,180	1,560	.429	.49	95,900
August	1,860	1,340	1,640	.451	.52	101,000
September	2,780	1,260	1,620	.445	.50	96,400
The year	35,000	1,180	3,520	.967	13.44	2,550,000

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BUTT CREEK AT BUTTE VALLEY, CALIF.

LOCATION.—At lower end of Butte Valley, 100 feet below footbridge, 1,000 feet above intake to Great Western Power Co.'s diversion flume, one-fourth mile south of Butte Valley post office, Plumas County, and 2 miles above junction with North Fork of Feather River.

DRAINAGE AREA.—73 square miles at original station.

RECORDS AVAILABLE.—June 14, 1905, to September 30, 1918.

GAGE.—Vertical staff on left bank, installed July 19, 1912, seven-eighths mile upstream from original vertical staff, which was on right bank. This gage is out of the influence of the low-water diversion dam near the flume intake for the Great Western Power Co.'s Butt Creek plant.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Sand, gravel, and clay; practically permanent.

EXTREMES OF DISCHARGE.—1905–1918: Maximum mean daily discharge, 1,640 second-feet January 16, 1909; minimum mean daily discharge, 10 second-feet August 27–28, 1918.

DIVERSIONS.—Pacific Gas & Electric Co. diverts water through Wallack ditch from Butt Creek above the station into the drainage basin of Yellow Creek; capacity of ditch, 15 to 20 second-feet.

REGULATION.—No information.

COOPERATION.—Daily-discharge record furnished by Great Western Power Co. through P. W. Ham, Chief engineer.

Daily discharge, in second-feet, of Butt Creek near Butte Valley, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	24	111	33	22	47	215	138	45	15	13	11
2	24	24	52	32	24	47	205	140	41	14	13	12
3	24	28	37	32	26	48	157	138	39	14	12	12
4	24	41	34	32	27	53	134	139	37	14	12	12
5	23	45	32	29	34	47	130	130	36	14	13	12
6	24	47	29	29	175	47	132	126	35	13	13	13
7	24	29	28	31	132	51	135	118	34	13	13	13
8	23	28	24	30	68	46	141	118	33	13	13	13
9	23	28	27	30	55	42	317	122	32	13	12	15
10	23	28	25	34	53	42	305	116	29	13	12	15
11	23	28	26	27	53	71	257	97	28	13	13	14
12	23	45	25	35	47	50	240	92	27	13	12	18
13	22	32	25	33	47	69	222	88	26	13	12	74
14	23	28	26	35	50	44	179	85	23	13	13	56
15	24	28	27	30	37	54	166	79	21	13	13	25
16	24	27	27	30	57	52	157	76	20	13	13	17
17	24	27	37	34	56	66	168	77	20	13	14	16
18	24	27	31	37	57	119	163	75	20	13	13	15
19	24	27	27	30	56	184	159	71	19	14	13	15
20	24	27	27	24	55	152	156	67	19	15	13	15
21	24	27	27	31	53	124	179	64	19	15	13	15
22	24	27	27	28	53	125	194	63	19	14	13	16
23	24	27	27	31	37	133	200	61	19	14	13	18
24	24	27	27	32	55	130	202	58	18	14	13	18
25	24	27	29	29	51	290	186	58	19	15	12	17
26	24	26	103	26	48	384	168	61	17	15	11	16
27	24	26	106	31	43	275	156	62	16	14	10	16
28	24	31	54	31	48	205	145	56	16	14	10	18
29	24	29	41	29	.....	195	140	53	16	14	11	68
30	24	38	38	26	.....	200	135	50	16	14	11	30
31	24	.....	35	24	.....	216	.....	47	.....	13	11	.....

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Monthly discharge of Butt Creek near Butte Valley, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	24	22	23.7	1,460
November	47	24	30.1	1,790
December	111	24	38.4	2,360
January	35	24	30.5	1,880
February	175	22	54.2	3,010
March	384	42	116	7,130
April	317	130	181	10,800
May	140	47	87.9	5,400
June	45	16	25.3	1,510
July	15	13	13.7	842
August	14	10	12.4	762
September	74	11	20.8	1,240
The year	384	10	52.8	38,200

INDIAN CREEK NEAR CRESCENT MILLS, CALIF.

LOCATION.—In SW. ¼ sec. 25, T. 26 N., R. 9 E., at lower end of Indian Valley, 2,000 feet below Arlington Bridge, and 1¼ miles below Crescent Mills, Plumas County. Spanish Creek enters 4 miles below station.

DRAINAGE AREA.—740 square miles.

RECORDS AVAILABLE.—January 1, 1906, to December 31, 1909, and September 10, 1911, to March 31, 1918, when station was discontinued.

GAGE.—Vertical staff in four sections on right bank near observer's house; read by Charles Quigley. Same site and datum used throughout record, but lowest section of gage was 0.46 foot too low 1911 to August 12, 1915.

DISCHARGE MEASUREMENTS.—Made from cable 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; fairly permanent. At low stages water is deep and sluggish at gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 7.18 feet at 5 a. m. March 27 (discharge, 2,780 second-feet); minimum stage recorded, 0.80 foot October 1–8 and 11 (discharge, 30 second-feet).

1906–1918: Maximum stage recorded, 20.2 feet at 6.30 a. m., crest of flood of March 19, 1907 (discharge, from extension of rating curve, about 11,700 second-feet); minimum stage recorded, 0.75 foot, August 9 to 15, 1908 (discharge, 12 second-feet).

DIVERSIONS.—Water is diverted from Indian Creek for irrigation in Indian and Genesee valleys.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed February 7. Rating curve used up to February 7 well defined between 30 and 4,000 second-feet; rating curve used after February 8 poorly defined. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good to February 7 and poor after February 7.

Discharge measurements of Indian Creek near Crescent Mills, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 14	J. F. Kunesh	2.31	207	Mar. 30	Charles Leidl	5.83	1,590
14	do	2.31	210	30	do	5.88	1,590

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Daily discharge, in second-feet, of Indian Creek near Crescent Mills, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	30	60	110	125	100	204	16	40	80	98	132	154	357
2	30	59	171	118	104	222	17	34	74	110	132	139	357
3	30	59	171	111	104	263	18	39	73	110	132	154	674
4	30	60	148	111	104	357	19	40	72	104	132	162	945
5	30	82	125	111	111	306	20	41	72	97	118	170	820
6	30	84	111	111	586	263	21	41	72	97	111	178	674
7	30	80	108	111	855	284	22	43	72	97	111	195	674
8	30	73	97	111	504	306	23	45	73	97	111	242	674
9	31	72	97	111	306	263	24	45	77	96	111	331	945
10	32	72	97	111	222	242	25	43	79	125	111	263	1,420
11	30	77	93	111	186	602	26	42	82	171	110	242	2,600
12	32	94	93	125	170	674	27	45	84	171	100	213	2,800
13	32	84	97	140	186	535	28	48	96	155	100	195	1,870
14	39	84	97	140	222	384	29	50	96	140	100	.....	1,560
15	40	84	97	140	170	357	30	53	100	125	100	.....	1,710
							31	58	.....	125	100	.....	1,870

Monthly discharge of Indian Creek near Crescent Mills, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	58	30	38.2	2,350
November	100	59	77.5	4,610
December	171	93	117	7,190
January	140	100	116	7,130
February	855	100	235	13,100
March	2,800	204	813	50,000
The period	.....	.....	.....	84,400

SPANISH CREEK AT KEDDIE, CALIF.

LOCATION.—In SW. ¼ sec. 22, T. 25 N., R. 9 E., at highway bridge at Keddie, Plumas County, 2 miles above junction with Indian Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 22, 1911, to September 30, 1918.

GAGE.—Staff gage in two sections on left bank 250 feet below bridge. First section inclined; second section vertical; fastened to alder trees. Gage read by Miller and Luman.

Prior to August 12, 1914, low-water section was a vertical staff fastened to a stump on left bank 20 feet below bridge and a high-water section painted on the left abutment of bridge. From August 12, 1914, to September 30, 1917, gage was a vertical staff in three sections; first section on right bank 50 feet above bridge; second section on left bank 20 feet below bridge; third section fastened to downstream side of left bridge pier. Datum of present gage independent of datum of previous gages.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Gravel; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.6 feet at 3.50 p. m. March 26 (discharge, from extension of rating curve, about 2,600 second-feet); minimum stage recorded, 2.95 feet August 15 and 28 (discharge, 17 second-feet).

1911–1918: Maximum stage recorded, 10.0 feet at 11 a. m. December 31, 1913, and at 1 p. m. January 2, 1914 (discharge, from extension of rating curve, about 9,450 second-feet); minimum stage recorded, 2.95 feet August 15 and 28, 1918 (discharge, 17 second-feet).

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DIVERSIONS.—Water is diverted from Spanish Creek for irrigation in American Valley.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 30 second-feet and 1,000 second-feet and is extended above and below. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except those for high water, which are fair.

Discharge measurements of Spanish Creek at Keddie, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 13	J. F. Kunesh	3.92	170	Mar. 31	Charles Leidl	5.75	885
13	do	3.91	159	June 29	J. F. Kunesh	3.26	41
Mar. 31	Charles Leidl	5.78	839				

Daily discharge, in second-feet, of Spanish Creek at Keddie, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	40	48	253	141	68	177	750	391	109	32	23	20
2	40	48	122	109	68	191	668	373	98	30	21	20
3	42	48	77	77	68	191	586	355	86	30	21	20
4	42	48	68	68	68	191	486	373	86	30	20	20
5	42	51	68	68	68	206	429	321	86	30	20	20
6	42	68	68	68	1,210	185	410	304	109	26	20	20
7	42	68	68	68	709	191	429	287	86	26	20	20
8	42	53	68	68	338	191	448	304	68	27	20	20
9	42	53	68	68	238	169	1,370	338	68	26	20	20
10	42	68	68	68	163	191	1,130	253	68	26	20	26
11	42	86	60	68	98	627	792	222	68	26	20	48
12	42	68	53	68	68	546	709	206	68	25	20	191
13	42	68	53	68	149	391	627	149	60	23	20	222
14	42	68	53	68	149	287	546	177	56	25	20	149
15	42	53	53	68	109	287	546	163	53	25	17	42
16	42	53	53	68	109	253	486	149	48	25	20	42
17	42	53	53	68	109	253	467	177	51	25	20	42
18	42	53	53	68	109	886	467	177	48	25	20	42
19	42	53	53	68	109	1,130	467	177	42	25	20	42
20	42	53	53	68	130	709	467	163	42	25	20	42
21	42	53	53	68	149	546	486	149	48	23	20	33
22	42	53	53	68	177	546	546	149	40	23	20	33
23	42	53	53	68	206	546	526	149	40	23	20	33
24	42	53	53	68	287	1,060	526	122	35	21	20	33
25	42	53	53	68	253	1,750	506	122	33	21	20	33
26	44	53	177	68	185	2,340	486	149	33	21	20	42
27	48	53	355	68	163	1,860	467	135	33	21	19	86
28	48	60	304	68	163	940	467	135	33	23	17	109
29	48	60	270	68	.....	792	448	163	33	23	20	109
30	48	149	253	68	.....	750	429	163	32	20	20	86
31	48	.....	222	68	.....	750	.....	122	.....	20	20	.....

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Monthly discharge of Spanish Creek at Keddie, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	48	40	42.9	2,640
November	149	48	60.0	3,570
December	355	53	107	6,580
January	141	68	72.0	4,430
February	1,210	68	204	11,300
March	2,340	169	617	37,900
April	1,370	410	572	34,000
May	391	122	213	13,100
June	109	32	58.7	3,490
July	32	20	24.9	1,530
August	23	17	19.9	1,220
September	222	20	55.5	3,300
The year	2,340	20	170	123,000

MIDDLE FORK OF FEATHER RIVER AT SLOAT, CALIF.

LOCATION.—Half a mile above Sloat, Plumas County, three-fourths mile above mouth of Poplar Creek, and 1½ miles below Cromberg.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 3, 1910, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder on right bank. Original gage was at California White Pine Co.'s log chute at Cromberg. Several changes in gage at that site were made. All were on downstream side of log chute piers and original datum was maintained. During construction of recorder well (Nov. 9–Dec. 4, 1913) a staff gage at new site and new datum was read. From December 5, 1913, to September 11, 1917, record is from a Gurley printing water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from cable 1 mile above gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel, apparently permanent. Left bank, flat and timbered; will be submerged at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.55 feet at 6 a. m. March 26 (discharge, 3,680 second-feet); minimum stage, 2.50 feet from 2–6 a. m. August 25 (discharge, 40 second-feet).

1910–1918: Maximum stage recorded, 13.0 feet April 7, 1911 (discharge, 9,640 second-feet); minimum stage recorded, 2.50 feet August 25, 1918 (discharge, 40 second-feet).

ICE.—Stage-discharge relation not affected by ice this year.

DIVERSION.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation has not changed since station was relocated in 1913; not affected by ice this year. Rating curve well defined below 6,000 second-feet and extended above. Mean daily gage height determined by inspecting the recorder graph. Daily discharge ascertained by applying mean daily gage-height to rating table, except February 6 when hourly discharge was averaged. Records excellent.

Discharge measurements of Middle Fork of Feather River at Sloat, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Feb. 12	3.56	319
12	3.53	295

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Daily discharge, in second-feet, of Middle Fork of Feather River at Sloat, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	53	56	314	112	83	135	2,320	939	282	64	47	45
2	53	56	145	110	83	151	2,110	858	284	63	49	45
3	53	56	120	108	85	163	1,660	858	286	62	48	44
4	53	56	108	105	93	200	1,360	930	286	60	46	43
5	53	58	100	102	105	200	1,210	885	286	59	44	43
6	53	66	95	98	948	222	1,120	800	286	58	43	43
7	53	63	93	102	564	234	1,070	768	282	57	43	43
8	53	64	87	102	355	234	1,130	760	274	55	42	43
9	53	64	85	100	365	222	2,320	690	262	55	42	43
10	53	66	84	87	410	262	2,400	606	250	56	42	43
11	53	66	82	87	380	322	2,320	578	222	57	42	43
12	53	79	81	89	318	314	2,180	573	226	57	41	64
13	53	75	79	91	294	262	1,910	568	218	58	41	192
14	53	74	78	93	250	254	1,480	564	192	56	41	274
15	53	72	77	95	200	282	1,320	514	178	55	42	108
16	53	72	81	95	203	282	1,220	490	169	54	46	77
17	54	72	87	102	258	290	1,240	484	160	53	47	66
18	55	72	87	120	206	490	1,230	466	151	53	46	60
19	56	72	89	112	172	676	1,130	430	142	52	45	58
20	56	72	89	100	182	627	1,220	405	133	53	44	56
21	56	72	87	95	172	669	1,320	395	124	54	43	56
22	56	74	87	93	178	760	1,410	385	115	53	42	56
23	56	74	91	89	192	939	1,390	385	106	51	42	56
24	56	75	91	89	200	1,210	1,270	375	97	51	41	56
25	56	75	93	91	172	2,250	1,170	355	89	51	40	56
26	56	75	250	91	166	3,340	1,060	340	81	50	41	55
27	56	75	230	95	157	3,340	930	326	74	49	41	55
28	56	75	163	108	145	3,170	921	298	70	48	41	70
29	56	75	138	85	.....	2,930	903	278	66	48	42	98
30	56	95	122	81	.....	2,700	912	262	64	48	42	74
31	56	.....	118	81	.....	2,470	.....	274	.....	48	46	.....

NOTE.—No gage-height record Dec. 9–14, May 12, 13, 26, June 2, 9, 16–24, July 14, 28, Aug. 4, 5, 18–23, and Sept. 21–23; discharge interpolated.

Monthly discharge of Middle Fork of Feather River at Sloat, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	56	53	54.4	3,340
November	95	56	69.9	4,160
December	314	77	114	7,010
January	120	81	97.0	5,960
February	948	83	248	13,800
March	3,340	135	955	58,700
April	2,400	903	1,440	85,700
May	939	262	543	33,400
June	286	64	182	10,800
July	64	48	54.5	3,350
August	49	40	43.3	2,660
September	274	43	68.8	4,090
The year	3,340	40	322	233,000

MIDDLE FORK OF FEATHER RIVER NEAR OROVILLE, CALIF.

LOCATION.—In NW. ¼ sec. 32, T. 20 N., R. 5 E., at highway bridge at Bidwell Bar, 2 miles above junction with North Fork, and 7 miles northeast of Oroville, Butte County. Canyon Creek enters three-fourths mile below and South Fork 1¼ miles above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 7, 1911, to September 30, 1918.

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GAGE.—Vertical staff in three sections; high-water section fastened to lower end of bridge pier near left bank; other sections fastened to a sycamore tree on left bank 100 feet above bridge; read by T. W. Curry.

DISCHARGE MEASUREMENTS.—Made from cable 250 feet below bridge.

CHANNEL AND CONTROL.—Boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.72 feet at 8 a. m. March 26 (discharge, 11,400 second-feet); minimum stage recorded, 1.86 feet August 31 and September 6 (discharge, 129 second-feet).

1911-1918: Maximum stage recorded, 18.0 feet at 4 p. m., December 31, 1913 (discharge, from extension of rating curve, about 34,200 second-feet); minimum stage recorded, 1.86 feet August 31 and September 6, 1918 (discharge, 129 second-feet).

DIVERSIONS.—The Palermo Land & Water Co.'s canal and South Feather Land & Water Co.'s canal divert from South Fork of Feather River and tributaries.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed March 26. Rating curves well defined below 14,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records excellent.

Discharge measurements of Middle Fork of Feather River near Oroville, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 6	Charles Leidl	6.24	2,980
July 21	do	2.22	233
Aug. 26	S. T. Harding	1.89	136

Daily discharge, in second-feet, of Middle Fork of Feather River near Oroville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	210	210	1,820	455	285	775	6,250	3,590	960	342	192	134
2	210	210	830	435	345	725	5,700	3,730	960	325	192	134
3	210	210	518	415	345	775	4,650	3,460	960	325	192	139
4	210	220	435	398	330	890	3,870	3,460	900	318	186	134
5	210	220	380	380	475	890	3,460	3,460	900	305	180	134
6	210	415	362	380	4,180	830	3,330	3,070	900	299	174	129
7	210	315	345	380	3,590	950	3,330	2,820	845	292	168	134
8	200	270	345	380	1,820	1,150	3,330	2,820	845	286	168	134
9	200	255	345	362	1,300	1,010	4,820	2,700	795	279	162	134
10	200	255	330	362	1,150	950	8,020	2,360	795	273	162	139
11	200	255	315	330	1,080	1,380	6,630	2,150	745	273	162	145
12	200	362	300	330	950	2,230	6,250	2,050	745	273	162	162
13	200	345	300	415	1,300	1,820	5,700	2,050	700	266	156	745
14	200	300	300	398	1,010	1,460	4,650	2,050	655	260	156	960
15	200	285	300	415	950	1,220	4,020	1,950	615	254	156	745
16	210	270	300	380	775	1,220	3,730	1,770	575	254	168	448
17	210	255	380	380	1,220	1,220	3,730	1,680	555	254	186	325
18	210	255	380	415	950	2,120	3,870	1,590	535	247	180	279
19	210	255	345	475	830	5,820	3,870	1,590	518	241	168	254
20	210	255	345	415	775	3,450	3,870	1,510	500	241	162	234
21	210	255	330	398	775	2,920	4,330	1,430	500	234	162	234
22	210	255	330	380	1,080	2,800	4,820	1,430	482	234	156	222
23	210	255	330	380	1,080	2,920	4,990	1,350	465	228	151	228
24	210	255	315	362	1,460	3,050	4,650	1,350	448	222	145	228
25	210	270	315	345	1,080	6,000	4,490	1,280	430	222	145	228
26	210	270	630	345	890	11,300	4,170	1,210	412	222	139	228
27	210	270	1,920	345	830	9,980	3,730	1,210	395	216	134	216
28	210	285	950	345	775	7,610	3,460	1,140	378	210	134	216
29	210	285	675	315	.....	6,820	3,460	1,080	360	210	134	430
30	210	285	562	330	.....	6,250	3,460	1,020	360	198	134	465
31	210	.....	495	315	.....	6,440	.....	1,020	.....	192	129	.....

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Monthly discharge of Middle Fork of Feather River near Oroville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	210	200	207	12,700
November	415	210	270	16,100
December	1,920	300	511	31,400
January	475	315	379	23,300
February	4,180	285	1,130	62,800
March	11,300	725	3,130	192,000
April	8,020	3,330	4,490	267,000
May	3,730	1,020	2,040	125,000
June	960	360	641	38,100
July	342	192	258	15,900
August	192	129	161	9,900
September	960	129	278	16,500
The year	11,300	129	1,120	811,000

SOUTH FORK OF FEATHER RIVER AT ENTERPRISE, CALIF.

LOCATION.—In NE. ¼ sec. 1, T. 19 N., R. 6 E., 800 feet above mouth of Powell Creek, and half a mile above highway bridge at Enterprise, Butte County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 8, 1911, to September 30, 1918.

GAGE.—Inclined staff bolted to ledge on right bank; read by Agnes Parks Alm. Original gage was 150 feet below; consisted of two vertical sections on left bank; read until November 8, 1913. Original datum maintained.

DISCHARGE MEASUREMENTS.—Made from cable 90 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.4 feet February 6 (discharge, 1,460 second-feet); minimum stage recorded, 2.5 feet August 21-24 (discharge, 0.3 second-foot).

1911-1918: Maximum stage recorded, 12.05 feet February 25, 1917 (discharge, from extension of rating curve, 10,600 second-feet); minimum stage recorded, 2.45 feet August 11, 1917 (discharge, 0.2 second-foot).

DIVERSIONS.—The diversion dam of the Palermo Land & Water Co.'s canal is 1 mile above the station. The South Feather Land & Water Co.'s canal diverts from Lost and Pinkard creeks above the station. This water is used for irrigation in the vicinity of Wyandotte and Bangor.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water February 6. Rating curves fairly well defined below 800 second-feet and extended above. They coincide at discharge of 1,460 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records considered good except those for extreme high water, which are fair.

Discharge measurements of South Fork of Feather River at Enterprise, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
	4.46	436
	2.62	1.0

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Daily discharge, in second feet, of South Fork of Feather River at Enterprise, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.5	1.5	227	80	44	118	790	500	84	0.8	0.8	0.6
2	1.5	1.5	99	80	44	118	790	500	74	.8	.8	.8
3	.5	1.5	80	63	44	118	690	500	57	.8	.8	.8
4	.5	1.5	38	63	49	145	550	525	57	.5	.8	.8
5	.5	1.5	38	63	80	145	525	475	50	.8	.8	.8
6	.5	63	38	63	1,840	118	500	405	50	.8	.8	.8
7	.5	63	38	63	605	145	605	405	50	.8	.8	.8
8	.5	18	32	49	238	205	550	382	50	.8	.8	.8
9	.5	18	32	49	238	174	850	382	38	.8	.8	.8
10	.5	18	32	49	174	205	1,060	382	33	.8	.8	.8
11	.5	18	27	49	145	790	990	315	28	.8	.8	.8
12	.5	32	27	49	145	550	885	315	23	.8	.8	6
13	.5	27	27	49	174	632	850	275	23	.8	.8	151
14	1.5	22	27	63	205	315	730	275	23	.8	.8	174
15	1.5	22	27	63	145	238	660	238	15	.8	.8	74
16	1.5	18	27	63	145	205	605	238	15	.8	.8	23
17	1.5	18	63	63	174	205	605	205	8	.8	.8	15
18	1.5	18	63	63	132	730	632	205	8	.8	.8	15
19	1.5	18	63	63	106	1,130	605	205	3.5	.8	.6	15
20	1.5	18	49	63	94	660	660	205	3.5	.8	.6	8
21	1.5	18	49	63	94	605	660	174	3.5	.8	.3	8
22	1.5	18	49	63	238	550	730	160	3.5	.8	.3	8
23	1.5	18	27	63	238	525	730	145	3.5	.8	.3	8
24	1.5	18	27	63	295	450	730	145	2.2	.8	.3	8
25	1.5	18	27	63	238	1,060	660	145	2.2	.8	.6	8
26	1.5	18	99	49	205	1,130	632	118	.8	.8	.6	8
27	1.5	18	295	49	145	1,460	605	118	.8	.8	.6	8
28	1.5	18	260	44	145	990	578	94	.8	.8	.6	8
29	1.5	22	227	44	.....	820	550	94	.6	.8	.6	43
30	1.5	27	167	44	.....	850	525	84	.6	.8	.6	23
31	1.5	.....	167	44	.....	790	.....	84	.....	.8	.6	.....

Monthly discharge of South Fork of Feather River at Enterprise, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1.5	0.5	1.15	70.7
November	63	1.5	19.7	1,170
December	295	27	80.3	4,940
January	80	44	58.0	3,570
February	1,840	44	229	12,700
March	1,460	118	522	32,100
April	1,060	500	684	40,700
May	525	84	268	16,500
June	84	.6	23.7	1,410
July	.8	.8	.80	49.2
August	.8	.3	.68	41.8
September	174	.6	20.7	1,230
The year	1,840	.3	158	114,000

PALERMO LAND & WATER CO.'S CANAL AT ENTERPRISE, CALIF.

LOCATION.—In NE. ¼ sec. 1, T. 19 N., R. 6 E., 1,000 feet above Alm's residence at Enterprise, Butte County, and three-fourths mile below intake at diversion dam on South Fork of Feather River.

RECORDS AVAILABLE.—October 8, 1911, to September 30, 1919.

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GAGE.—Vertical staff installed April 13, 1915 (readings began Apr. 14), on right wall on concrete approach to sheet-iron flume; read by Agnes Parks Alm. Original gage, which was read up to March 31, 1914, and also from March 15 to April 13, 1915, during rebuilding of flume just above it, was vertical staff fastened to post on right bank about one-fourth mile below. Datum of this gage was lowered 1.00 foot November 9, 1913. From April 1, 1914, to March 14, 1915, readings were taken from a gage installed March 22, 1914, in the flume, about 800 feet above old gage. Relations between the three gages used have not been determined.

DISCHARGE MEASUREMENTS.—Made from foot plank at gage.

CHANNEL AND CONTROL.—Control is throat of concrete approach to metal flume. Control at original station is a stretch of channel which is gravel and sand. Control at original station is a stretch of channel which is gravel and sand. Control for gage in the old wooden flume was also a stretch of channel.

EXTREMES OF DISCHARGE.—1911–1918: Maximum discharge recorded, 41 second-feet June 17, 1918; no flow during periods of every year.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records excellent.

This canal furnishes water for irrigation below Oroville.

Discharge measurements of Palermo Land & Water Co.'s canal at Enterprise, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 6	2.00	28
6	2.12	32
July 21	1.68	21

Daily discharge, in second-feet, of Palermo Land & Water Co.'s canal at Enterprise, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	26	24	7.6	9.8	12.5	20	16.6	28	40	31	17.6	15.2
2	26	24	9.8	9.8	12.5	20	16.6	28	40	30	17.6	15.4
3	25	25	9.5	9.8	15.3	20	16.6	28	40	30	17.6	15.0
4	24	26	9.5	9.8	20	20	16.6	28	40	29	17.2	14.8
5	24	23	9.5	9.8	21	20	16.6	28	40	28	17.6	15.2
6	24	19.0	9.5	9.8	11.4	20	16.4	32	40	28	17.2	15.2
7	24	19.0	9.5	9.8	11.3	17.7	16.6	32	40	26	16.8	15.4
8	24	19.0	9.4	9.8	25	10.1	16.4	32	40	26	16.8	15.6
9	24	19.0	9.4	9.8	25	10.1	16.8	32	40	27	16.8	16.0
10	24	19.0	9.5	9.6	25	10.1	16.8	32	40	26	16.8	16.4
11	24	18.5	9.5	9.6	25	11.1	16.8	35	40	26	16.6	16.4
12	24	18.3	9.5	9.6	24	10.9	16.8	35	40	25	16.4	22
13	24	18.3	9.5	9.6	25	9.2	16.8	38	40	25	16.4	22
14	24	18.3	9.5	9.8	25	8.3	16.6	38	41	24	16.4	7.6
15	24	18.3	9.5	9.8	25	4.6	16.6	38	40	24	17.2	11.7
16	24	18.3	9.5	9.8	18.7	3.4	16.6	37	40	24	18.5	18.1
17	25	18.5	9.5	9.8	6.4	8.5	16.6	37	41	23	18.3	17.6
18	24	18.5	9.5	9.8	6.4	11.9	16.6	37	40	23	18.5	17.6
19	24	18.3	9.5	9.6	14.8	12.8	18.5	37	40	22	18.1	17.6
20	24	18.3	9.5	9.6	14.8	3.2	24	39	39	22	16.4	17.6
21	24	18.3	9.5	9.6	15.2	3.1	24	39	39	21	16.4	17.6
22	24	18.1	9.5	9.8	15.4	12.3	27	39	39	21	16.2	18.1
23	24	18.1	9.4	9.8	15.4	7.0	28	39	37	20	16.2	18.1
24	24	18.1	9.4	9.8	15.6	14.8	28	39	38	21	15.9	18.1
25	24	18.3	9.4	9.6	15.2	15.6	28	39	38	20	15.2	18.1
26	24	18.3	9.5	9.6	20	14.1	28	39	37	20	15.2	17.6
27	24	18.3	9.8	11.2	20	13.2	28	39	36	20	15.2	17.6
28	24	18.3	9.8	12.1	20	12.8	28	39	35	19.4	15.2	17.6
	23	18.3	9.5	12.1	.....	15.5	28	38	33	18.5	15.2	18.1
	24	15.2	9.5	12.1	.....	16.4	28	38	32	18.5	14.8	18.1
	24	.....	9.5	12.5	.....	17.0	.....	39	.....	17.9	14.6	.....

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Monthly discharge of Palermo Land & Water Co.'s canal at Enterprise, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	26	23	24.2	1,490
November	26	15.2	19.3	1,150
December	9.8	7.6	9.45	581
January	12.5	9.6	10.1	621
February	25	6.4	17.9	904
March	20	3.1	12.7	781
April	28	16.4	20.6	1,230
May	39	28	35.4	2,180
June	41	32	38.8	2,310
July	31	17.9	23.8	1,460
August	18.5	14.6	16.6	1,020
September	22	7.6	16.7	994
The year	41	3.1	20.4	14,800

MIDDLE FORK OF YUBA RIVER[1] NEAR NORTH SAN JUAN, CALIF.

LOCATION.—In N. ½ NW. ¼ sec. 23, T. 18 N., R. 8 E., below highway bridge at Freeman's Crossing, in Tahoe National Forest, 1¼ miles northeast of North San Juan, Nevada County. Oregon Creek enters three-fourths mile above, Moonshine Creek one-fourth mile below, and North Fork of Yuba River 4 miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 27, 1910, to September 30, 1918.

GAGE.—Vertical staff wedged between two large boulders on right bank one-fourth mile below bridge; read by Henry Zurhorst.

DISCHARGE MEASUREMENTS.—Made from cable 200 feet above gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.2 feet March 27 (discharge, 2,270 second-feet); minimum stage recorded, 4.3 feet August 28 to September 9 (discharge, 32 second-feet).

1910–1918: Maximum stage recorded, 11.7 feet at 10 a. m. May 12, 1915 (discharge, 14,300 second-feet); minimum stage recorded, 4.30 feet August 28 to September 9, 1918 (discharge, 32 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation has not changed since May 13, 1915. Rating curve well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying gage height to table. Records excellent.

Discharge measurements of Middle Fork of Yuba River near North San Juan, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 3	4.42	44
Sept. 27	4.47	52

[1] Known locally as Middle Yuba River.

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Daily discharge, in second-feet, of Middle Fork of Yuba River near North San Juan, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	46	46	380	90	62	169	1,130	1,130	435	68	41	32
2	46	46	162	78	78	198	1,130	1,240	424	62	41	32
3	46	50	102	74	74	206	800	1,130	435	62	41	32
4	46	46	83	68	74	282	650	1,240	435	58	41	32
5	46	46	78	68	83	238	615	930	435	58	41	32
6	43	78	68	68	1,480	218	550	930	408	58	41	32
7	43	58	62	68	760	340	685	980	408	55	38	32
8	43	58	58	68	355	408	615	980	391	55	38	32
9	43	58	58	68	206	306	1,610	760	380	55	38	32
10	43	46	58	68	230	292	1,920	615	408	55	34	34
11	43	55	58	62	198	1,240	1,480	550	330	55	41	34
12	43	83	58	83	180	306	1,360	615	320	50	38	74
13	46	55	58	108	292	550	1,130	685	282	50	38	191
14	43	58	58	102	206	408	930	650	260	55	38	490
15	46	58	58	90	206	380	840	615	206	50	38	162
16	43	55	58	83	191	340	760	582	191	50	43	102
17	46	58	78	83	282	340	760	550	169	50	43	74
18	55	55	78	102	198	550	840	550	162	46	43	58
19	50	55	74	90	169	1,760	840	550	162	46	43	58
20	50	55	62	83	180	840	980	550	146	46	38	55
21	46	50	62	78	198	685	1,130	550	136	46	38	50
22	46	55	62	78	355	615	1,240	550	130	43	34	58
23	46	55	58	78	408	615	1,360	550	124	43	34	62
24	46	50	58	78	550	615	1,240	550	116	43	34	58
25	46	55	58	74	306	1,540	1,130	550	102	43	34	55
26	46	55	136	74	260	2,090	1,080	490	102	43	34	55
27	46	55	292	62	229	2,270	930	408	90	43	34	50
28	46	58	146	62	198	1,300	930	380	83	43	32	50
29	46	58	108	68	.....	1,030	1,030	330	78	43	32	97
30	46	55	90	68	.....	1,030	1,030	380	78	41	32	55
31	46	.....	78	74	.....	1,130	.....	435	.....	41	32	.....

Monthly discharge of Middle Fork of Yuba River near North San Juan, Calif., for the year ending Sept. 30, 1918.

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	55	43	45.7	2,810
November	83	46	55.5	3,300
December	380	58	93.5	5,750
January	108	62	77.4	4,760
February	1,480	62	286	15,900
March	2,270	169	719	44,200
April	1,920	550	1,020	60,700
May	1,240	330	678	41,700
June	435	78	248	14,800
July	68	41	50.2	3,090
August	43	32	37.6	2,310
September	490	32	73.7	4,390
The year	2,270	32	282	204,000

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YUBA RIVER AT SMARTSVILLE, CALIF.

LOCATION.—In sec. 22, T. 16 N., R. 6 E., at Narrows, 1 mile north of Smartsville, Yuba County, 1 mile below mouth of Deer Creek, 6½ miles below mouth of South Fork, 7 miles above mouth of Dry Creek, and 18 miles above junction with Feather River.

DRAINAGE AREA.—1,220 square miles.

RECORDS AVAILABLE.—June 2, 1903, to September 30, 1918.

GAGE.—Staff in three sections, bolted to solid rock on left bank, read by Joseph French. On account of the gradual erosion of the channel, gage datum was lowered 10 feet August 1, 1906. Before the change, first section was vertical and driven into gravel near left bank 50 feet below cable; second section was painted on rock ledge on left bank.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water. As the result of extensive hydraulic mining in the early days the channel has been filled with an enormous quantity of tailings. At the station, the depth of mining débris is estimated to be more than 80 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.7 feet February 6 and March 19 (discharge, 13,100 second-feet); minimum stage recorded, 1.54 feet August 28–30 (discharge, 162 second-feet).

1903–1918: Maximum stage recorded, 28.3 feet January 15, 1909 (discharge, 111,000 second-feet); minimum stage recorded, 1.54 feet August 28–30, 1918 (discharge, 162 second-feet). Bed of stream is being eroded so that stage becomes lower each year.

DIVERSIONS.—Water is diverted for power and irrigation above the station. See next paragraph.

REGULATION.—Lake Spaulding, and several small glacial lakes near the headwaters of the South Fork of Yuba River are utilized as storage reservoirs. A part of this water is diverted into the Bear River drainage basins.

ACCURACY.—Stage-discharge relation changed during high water of February 6 and September 14. Rating curves well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of Yuba River near Smartsville, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	J. F. Kunesh	2.02	248	July 19	Charles Leidl	1.98	298
Mar. 7	Charles Leidl	4.39	2,130	Sept. 26	J. F. Kunesh	2.15	323
May 4	do	6.19	4,790				

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Daily discharge, in second-feet, of Yuba River at Smartsville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	276	226	3,110	438	417	1,250	5,770	4,840	2,140	432	192	178
2	313	210	955	417	460	1,340	5,580	4,840	2,270	432	178	178
3	313	226	915	396	396	1,390	4,670	4,840	2,400	410	178	178
4	294	242	482	396	375	1,440	4,180	4,500	2,400	388	178	178
5	276	276	438	375	482	1,300	3,550	4,500	2,400	388	178	178
6	313	417	417	396	13,100	1,040	3,550	4,670	2,270	388	178	192
7	276	334	375	438	4,840	3,860	4,180	4,340	2,140	367	178	222
8	242	276	396	460	2,400	2,530	3,860	5,020	2,020	388	178	206
9	242	259	354	438	1,500	1,900	9,380	4,180	1,900	367	178	237
10	242	313	375	417	1,250	4,180	8,180	3,700	1,660	346	178	237
11	242	276	354	396	1,080	6,150	7,120	3,250	1,550	326	178	254
12	242	438	354	438	1,300	7,960	6,340	3,250	1,390	306	178	367
13	226	417	354	560	1,780	3,860	5,960	3,860	1,250	306	178	1,340
14	242	313	334	587	1,550	2,950	5,200	4,180	1,120	306	165	3,100
15	242	313	334	507	1,340	2,670	4,500	3,860	1,010	306	165	1,900
16	242	294	354	460	1,160	2,400	4,180	3,400	940	306	178	580
17	242	276	460	438	3,100	2,400	4,180	3,250	870	306	192	458
18	242	294	482	482	1,060	3,100	4,340	3,100	810	306	206	390
19	242	313	396	560	1,390	13,100	4,500	2,950	720	306	192	345
20	242	313	354	482	1,250	5,200	4,840	2,950	662	270	178	325
21	242	313	354	532	1,500	4,020	5,390	3,250	690	270	178	325
22	259	313	354	460	2,530	3,860	6,340	3,250	635	270	178	305
23	242	294	334	438	4,180	3,550	5,580	3,550	580	270	165	325
24	226	276	354	438	3,400	3,700	5,390	3,250	608	270	165	325
25	226	276	438	417	2,400	6,340	5,200	3,100	580	270	165	305
26	210	334	770	438	1,900	9,640	4,840	2,950	555	270	165	270
27	210	313	2,280	438	1,550	9,380	4,840	2,950	530	237	165	270
28	242	354	878	417	1,390	6,530	4,670	2,400	505	237	165	345
29	242	375	675	396	.....	5,580	4,500	1,780	480	237	165	530
30	242	334	560	375	.....	5,390	4,500	1,900	456	206	165	505
31	242	.....	482	396	.....	5,580	.....	1,900	.....	206	165	.....

Monthly discharge of Yuba River at Smartsville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	313	210	251	15,400
November	438	210	307	18,300
December	3,110	334	615	37,800
January	587	375	446	27,400
February	13,100	375	2,130	118,000
March	13,100	1,040	4,310	265,000
April	9,380	3,550	5,180	308,000
May	5,020	1,780	3,540	218,000
June	2,400	456	1,250	74,400
July	432	206	313	19,200
August	206	165	176	10,800
September	3,100	178	485	28,900
The year	13,100	165	1,580	1,140,000

OREGON CREEK NEAR NORTH SAN JUAN, CALIF.

LOCATION.—In N. ½ SE. ¼ sec. 28, T. 18 N., R. 8 E., below highway bridge in Tahoe National Forest, 500 feet above junction with Middle Fork of Yuba River, half a mile above Freeman's Crossing, Yuba County, and 2 miles northeast of North San Juan, Nevada County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 28, 1910, to September 30, 1918.

GAGE.—Vertical staff fastened to an alder tree on right bank 150 feet below bridge; read by H. Zurhorst.

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DISCHARGE MEASUREMENTS.—Made from cable 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.7 feet at 9 a. m. March 27 (discharge, 585 second-feet); minimum stage recorded, 3.58 feet August 30 to September 1 (discharge, 1.8 second-feet).

1910–1918: Maximum stage recorded, 8.5 feet at 5 p. m. December 31, 1913 (discharge, from extension of rating curve, about 4,080 second-feet); minimum stage recorded, 3.70 feet September 13 to 20, 1913 (discharge, 2 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve fairly well defined below 100 second-feet and extended above. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records fair.

Discharge measurements of Oregon Creek near North San Juan, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 3	3.63	2.4
Sept. 27	3.80	5.3

Daily discharge, in second-feet, of Oregon Creek near North San Juan, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.6	3.6	65	6.5	5	32	235	54	7.5	3.3	2.3	1.8
2	2.6	3.6	8.5	6	6	38	195	51	7.5	3.3	2.3	2.0
3	2.3	3.6	6.5	5.5	5.5	41	155	51	7.5	3.6	2.3	2.0
4	2.3	3.6	6.5	5.5	5	51	122	48	7	3.6	2.3	2.0
5	2.3	3.6	6	5	7	41	100	41	6.5	3.3	2.3	2.0
6	2.3	6.5	5.5	5	385	48	100	44	6.5	3.3	2.3	2.0
7	2.6	5	5	5	122	76	155	44	6.5	3.3	2.3	2.0
8	2.6	5	5	5	58	44	122	36	6.5	3.3	2.3	2.0
9	2.6	5	5	5	38	26	195	38	8	3.0	2.3	2.3
10	3.0	5	5	5.5	26	94	320	32	6.5	3.0	2.3	2.3
11	3.0	5	5	5.5	15	[a] 270	235	26	6	3.0	2.3	2.0
12	3.0	6.5	5	7.5	8.5	148	195	26	6	3.0	2.3	6.5
13	3.0	6	5	8	51	148	195	24	6	3.0	2.3	26
14	3.0	5	5	8.5	38	91	155	24	5.5	3.0	2.0	65
15	3.0	5	5	6.5	15	79	129	15	5.5	2.6	2.0	10
16	3.0	5	5	6.5	8.5	72	108	15	5.5	2.6	3.3	7
17	3.3	5	6.5	6.5	38	68	100	15	5.5	3.0	3.3	6.5
18	3.3	5	6	7	28	129	94	15	5.5	3.0	3.3	6
19	3.3	5	5.5	7.5	20	445	94	15	5	3.0	3.3	5.5
20	3.3	5	5.5	7	15	235	94	15	5	3.0	3.0	5
21	3.3	5	5	6.5	24	155	91	14	5	3.0	3.0	5
22	3.3	5	5	6.5	65	148	94	14	5	3.0	3.0	5.5
23	3.3	5	5	6.5	76	148	94	10	5	2.3	2.3	6
24	3.3	5	5	6.5	122	129	82	10	4.7	3.0	2.3	6
25	3.3	5	5	6	65	445	79	10	4.7	3.0	2.0	5.5
26	3.3	5	15	5	51	510	79	8.5	5	2.6	2.0	5.5
27	3.6	5	38	6	[b] 44	585	68	10	5	2.6	2.0	5.5
28	3.6	5	8.5	6	38	358	65	10	4.2	3.0	2.0	5
29	3.6	5	8	6	.....	280	65	7.5	4.2	3.0	2.0	7.5
30	3.6	5	7	6	.....	244	65	7.5	3.3	2.6	1.8	6.5
31	3.6	.....	6.5	5	.....	235	.....	7.5	.....	2.3	1.8	.....

[a] No gage-height record; discharge estimated from record of flow of Goodyear Creek at Rock Creek at Goodyear Bar.

[b] No gage-height record; discharge interpolated.

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Monthly discharge of Oregon Creek near North San Juan, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	3.6	2.3	3.04	187
November	6.5	3.6	4.90	292
December	65	5	9.02	555
January	8.5	5	6.15	378
February	385	5	49.3	2,760
March	585	26	175	10,800
April	320	65	129	7,680
May	54	7.5	23.8	1,460
June	8	3.3	5.72	340
July	3.6	2.3	2.99	184
August	3.3	1.8	2.40	148
September	65	1.8	7.26	432
The year	585	1.8	34.7	25,200

NORTH FORK OF YUBA RIVER[1] AT GOODYEAR BAR, CALIF.

LOCATION.—In E. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., in Tahoe National Forest, at highway bridge at Goodyear Bar, Sierra County. Rock Creek and Goodyear Creek enter one-eighth and one-fourth mile, respectively, below station; and North Fork of North Fork of Yuba River enters at Downieville, 4 miles above.

DRAINAGE AREA.—214 square miles.

RECORDS AVAILABLE.—October 31, 1910, to September 30, 1918.

GAGE.—Vertical staff in two sections on left bank; low-water section fastened to old piling under bridge; upper section bolted to left abutment of bridge; read by G. E. King.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge, or by wading.

CHANNEL AND CONTROL.—Solid rock, small boulders, and gravel; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.5 feet April 9 (discharge, 2,790 second-feet); minimum stage recorded, 3.1 feet August 8–17, and August 24 to September 1 (discharge, 109 second-feet).

1910–1918: Maximum stage recorded, 11.5 feet at 5.40 p. m. May 11, 1915 (discharge, 12,600 second-feet): minimum stage recorded, 3.1 feet August 8 to 17 and August 24 to September 1, 1918 (discharge, 109 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined below 4,000 second-feet and extended above. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Forest Service

Discharge measurements of North Fork of Yuba River at Goodyear Bar, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 5	3.25	146
Sept. 28	3.35	170

[1] Known locally as North Yuba River.

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Daily discharge, in second-feet, of North Fork of Yuba River at Goodyear Bar, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	146	133	460	176	160	235	1,130	1,820	[a]730	227	146	109
2	146	133	227	176	160	268	1,050	1,600	722	227	146	121
3	146	133	192	176	160	290	895	1,710	722	210	133	121
4	146	133	192	176	160	312	825	1,600	690	210	133	133
5	133	160	160	176	160	290	755	1,500	690	210	133	133
6	133	160	160	176	2,050	336	755	1,600	690	192	121	133
7	133	160	160	176	630	460	790	1,600	690	192	121	133
8	133	160	160	160	359	359	[b]770	1,310	690	192	109	133
9	133	160	160	160	359	312	2,790	1,130	690	192	109	133
10	133	160	146	160	336	408	1,600	970	[a]656	192	109	133
11	133	160	146	160	312	755	[b]1,400	895	[a]623	192	109	133
12	133	210	146	210	312	570	[b]1,300	1,130	[a]589	176	109	312
13	133	160	146	210	312	460	1,220	[a]1,110	[a]556	176	109	460
14	133	160	146	210	336	408	1,050	[a]1,080	[a]522	176	109	434
15	133	160	146	176	290	359	970	[a]1,060	488	176	109	227
16	133	133	146	176	268	384	970	[a]1,040	460	176	109	192
17	133	133	146	176	312	384	1,010	[a]1,020	408	176	109	176
18	133	133	146	227	268	970	1,050	[a]990	408	160	121	160
19	133	133	146	176	268	312	1,130	970	384	160	121	160
20	133	133	146	160	248	630	1,220	970	[a]372	160	133	160
21	133	133	160	[a]160	268	570	1,310	970	359	160	133	[a]156
22	133	133	160	[a]160	312	570	1,820	970	336	160	121	[a]153
23	133	133	160	[a]165	408	600	1,710	932	312	146	121	[a]150
24	133	133	160	[a]165	359	630	1,600	895	290	146	109	146
25	133	133	176	[a]170	290	1,400	1,500	895	290	146	109	146
26	133	133	570	[a]170	268	1,930	1,310	825	268	146	109	149
27	133	133	359	176	268	1,400	1,310	755	268	146	109	146
28	133	133	268	160	248	1,050	1,310	755	[a]258	146	109	192
29	133	133	227	160	.....	1,010	1,400	755	[a]248	146	109	192
30	133	176	192	160	.....	1,130	1,500	[a]747	[a]237	146	109	160
31	133	.....	176	160	.....	1,130	.....	[a]739	.....	146	109	.....

[a] Gage not read; discharge interpolated.
[b] Gage not read; discharge estimated from record of flow of Middle Fork of Yuba River at North San Juan.

Monthly discharge of North Fork of Yuba River at Goodyear Bar, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 214 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	146	133	135	0.631	0.73	8,300
November	210	133	146	.682	.76	8,690
December	570	146	196	.916	1.06	12,100
January	227	160	174	.813	.94	10,700
February	2,050	160	353	1.65	1.72	19,600
March	1,930	235	643	3.01	3.47	39,500
April	2,790	755	1,250	5.84	6.52	74,400
May	1,820	739	1,110	5.19	5.98	68,300
June	730	237	488	2.28	2.54	29,000
July	227	146	174	.813	.94	10,700
August	146	109	118	.551	.64	7,260
September	460	109	176	.822	.95	10,500
The year	2,790	109	413	1.93	26.25	299,000

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NORTH FORK OF NORTH FORK OF YUBA RIVER[1] AT DOWNIEVILLE, CALIF.

LOCATION.—In NE. ¼ NW. ¼ sec. 35, T. 20 N., R. 10 E., at upper highway bridge in Downieville, Sierra County, 500 feet above dam and one-fourth mile above junction with North Fork of Yuba River. East Fork of North Fork enters one-eighth mile above and Middle Fork of North Fork 1¼ miles above station.

DRAINAGE AREA.—71.2 square miles.

RECORDS AVAILABLE.—November 1, 1910, to September 30, 1918.

GAGE.—Vertical staff fastened to right abutment of bridge; read by J. T. Mason.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Bed consists of gravel and small boulders. Since flood of May 11, 1915, control is the dam.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.5 feet February 6 and April 9 (discharge, 1,140 second-feet); minimum stage recorded, 3.0 feet September 1–12 (discharge, 32 second-feet).

1911–1918: Maximum stage recorded, 8.0 feet at 5 p. m. May 11, 1915 (discharge, from extension of rating curve, about 6,760 second-feet); minimum stage recorded, 3.0 feet September 1–12, 1918 (discharge, 32 second-feet).

ICE.—Stage-discharge relation slightly affected by ice for short periods in severe winters.

DIVERSIONS.—The intake of the municipal water system of Downieville is above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation dependent on the presence and height of flashboards on the dam and on the operation of the power plant which diverts water between the gage and dam. Observer has been instructed to read the gage when plant is not running. It is usually shut down between 7.30 a. m. and 4.30 p. m. Flashboards 18 inches high and 24 inches high were used this year. Rating curve for 18-inch boards fairly well defined. Gage read to half-tenths (sometimes hundredths), twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, after making proper correction for height of flashboard. Records fair.

COOPERATION.—Gage-height record furnished by John T. Mason.

Discharge measurements of North Fork of North Fork of Yuba River at Downieville, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 4	2.67	54
Sept. 28	3.15	78
Sept. 29	3.14	74

[1] Known locally as North Fork of North Yuba River.

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Daily discharge, in second-feet, of North Fork of North Fork of Yuba River at Downieville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	60	52	162	68	60	79	350	510	180	60	48	32
2	60	52	63	68	60	79	350	650	180	60	46	32
3	60	52	60	68	60	79	295	615	180	60	46	32
4	57	52	60	68	60	79	245	545	180	60	46	32
5	55	57	60	60	60	79	245	580	180	60	44	32
6	55	90	60	60	900	79	245	545	180	60	44	32
7	55	75	60	60	180	115	245	475	162	60	44	32
8	55	75	60	60	115	102	245	475	162	60	44	32
9	55	57	60	60	98	102	855	350	145	60	44	32
10	55	52	60	60	90	102	650	338	130	60	44	32
11	55	60	60	60	90	220	580	320	130	60	44	32
12	55	68	60	60	90	145	545	320	115	52	44	60
13	55	60	60	60	90	130	380	320	115	52	44	108
14	55	60	57	60	90	130	350	320	102	52	44	362
15	55	60	55	60	79	115	350	350	102	52	44	108
16	55	52	57	60	79	102	350	305	83	52	44	90
17	55	52	57	60	79	102	350	305	79	52	44	68
18	55	52	55	60	79	270	350	255	79	52	44	68
19	55	60	52	60	79	255	350	245	79	52	44	68
20	55	60	52	60	79	115	350	270	79	50	44	68
21	55	60	52	60	79	145	510	295	79	50	44	68
22	55	60	52	60	79	145	730	270	79	50	44	60
23	52	60	52	60	98	162	580	265	79	50	44	60
24	52	60	52	60	98	200	615	255	79	49	37	60
25	52	60	52	60	79	580	545	255	68	49	37	52
26	52	60	162	60	79	990	475	220	68	49	37	52
27	52	60	130	60	79	475	440	220	68	49	37	52
28	52	60	75	60	79	380	440	192	68	49	37	65
29	52	60	68	60	.....	380	510	180	68	48	37	79
30	52	60	68	60	.....	350	510	180	68	48	37	65
31	52	.....	60	60	.....	350	.....	180	.....	48	37	.....

NOTE.—18-inch flashboards on dam Oct. 1 to Aug. 15; 24-inch flashboards on dam Aug. 15 to Sept. 13 and Sept. 16 to 30. Flashboards partly destroyed Sept. 14–16.

Monthly discharge of North Fork of North Fork of Yuba River at Downieville, Calif., for the year ending Sept. 30, 1918.

[Drainage area, 71.2 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	60	52	54.7	0.768	0.89	3,360
November	90	52	59.9	.841	.94	3,560
December	162	52	67.5	.948	1.09	4,150
January	68	60	61.0	.857	.99	3,750
February	900	60	114	1.60	1.67	6,330
March	990	79	214	3.01	3.47	13,200
April	855	245	434	6.10	6.81	25,800
May	650	180	342	4.80	5.53	21,000
June	180	68	112	1.57	1.75	6,660
July	60	48	53.7	.754	.87	3,300
August	48	37	42.5	.597	.69	2,610
September	362	32	65.5	.920	1.03	3,900
The year	990	32	135	1.90	25.73	97,600

ROCK CREEK AT GOODYEAR BAR, CALIF.

LOCATION.—In W. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., at footbridge at Goodyear Bar, Sierra County, in Tahoe National Forest. Woodruff Creek enters 350 feet above station, and Rock Creek joins North Fork of Yuba River 600 feet below.

DRAINAGE AREA.—10.8 square miles.

RECORDS AVAILABLE.—October 30, 1910, to September 30, 1918.

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GAGE.—Vertical staff fastened to an alder tree on right bank 40 feet below bridge, read by G. E. King.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; rough; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.4 feet April 9 (discharge, 215 second-feet); minimum stage recorded, 1.05 feet August 4 to 9, 24 and 25 (discharge, 0.3 second-foot).

1910-1918: Maximum stage recorded, 7.0 feet at 3.30 p. m., December 31, 1913 (discharge, from extension of rating curve, about 820 second-feet); minimum stage recorded, 0.95 foot July 18, 19, 23, and 24, 1917, and 1.05 feet August 4 to 9, 24 and 25, 1918 (discharge, 0.3 second-foot).

DIVERSIONS.—Three small ditches, having a total capacity of about 10 second-feet, head above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly at low water. Rating curves well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Rock Creek at Goodyear Bar, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 5	1.11	1.2
Sept. 28	1.33	2.6

Daily discharge, in second-feet, of Rock Creek at Goodyear Bar, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.4	1.8	9	2.6	2.6	12	106	62	7.5	0.6	0.4	0.4
2	1.1	1.8	4.1	3.4	2.6	15	83	62	7.5	.4	.4	.4
3	1.1	1.8	4.1	2.6	2.6	17	73	52	7.5	.8	.4	.4
4	1.1	1.8	2.6	2.6	2.6	20	63	48	6	.8	.3	.4
5	1.8	2.6	2.6	2.6	4.1	15	54	43	4.5	.6	.3	.4
6	1.1	2.6	2.6	2.6	94	17	54	43	4.5	.4	.3	.4
7	1.1	2.6	2.6	2.6	38	38	63	35	4.5	.4	.3	.4
8	1.1	2.6	2.6	1.8	17	26	90	35	4.5	.4	.3	.4
9	1.1	2.6	2.6	1.8	12	17	215	35	3.2	.6	.3	.4
10	1.1	4.1	2.6	1.8	9	23	133	28	2.8	.4	.4	.4
11	1.1	4.1	2.6	1.8	9	133	115	28	2.4	.8	.4	.4
12	1.1	6	2.6	4.1	9	73	105	28	2.0	.6	.4	22
13	1.1	4.1	2.6	4.1	11	46	94	26	1.6	.4	.6	22
14	1.1	4.1	2.6	4.1	17	38	83	25	1.2	.4	.4	7.5
15	1.1	4.1	2.6	3.4	12	30	72	23	.8	.4	.4	4.5
16	1.1	3.4	2.6	3.4	11	26	72	21	.8	.8	.4	2.0
17	1.1	3.4	2.6	3.4	17	26	72	20	.8	.6	.4	2.0
18	1.1	3.4	2.6	5	12	180	72	18	.8	.6	.4	2.0
19	1.1	2.6	2.6	4.1	11	106	72	16	.8	.4	.4	2.0
20	1.1	2.6	1.8	4.1	9	73	83	14	.8	.4	.4	2.0
21	1.1	2.6	1.8	3.9	11	54	83	12	.8	.4	.4	2.0
22	1.1	2.6	1.1	3.7	17	54	94	12	.8	.4	.4	1.8
23	1.1	2.6	1.1	3.5	38	54	94	12	.8	.6	.4	1.6
24	1.1	2.6	1.1	3.3	38	54	83	12	.8	.6	.3	1.4
25	1.1	2.6	1.8	3.0	20	133	72	12	.8	.6	.3	1.4
26	1.8	2.6	17	2.8	17	180	62	12	.8	.6	.4	1.4
27	1.8	2.6	9	2.6	12	147	62	9.5	.8	.6	.4	1.4
28	1.8	2.6	4.1	2.6	12	106	62	9.5	.8	.4	.4	3.2
29	1.8	2.6	4.1	2.6	.....	94	62	7.5	.6	.4	.4	3.2
30	1.8	4.1	3.4	2.6	.....	106	62	7.5	.6	.4	.4	2.0
31	1.8	.....	2.6	2.6	.....	106	.....	7.5	.....	.4	.4	.....

NOTE.—Gage not read Jan. 21-26, Apr. 8, 11, 12, May 13-18, May 30 to June 1, June 10-14, 20, 28-30, and Sept. 22 and 23; discharge interpolated except that for Apr. 8, 11, 12, which was estimated from record of flow of Oregon Creek.

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Monthly discharge of Rock Creek at Goodyear Bar, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1.8	0.4	1.24	76.2
November	6	1.8	2.99	178
December	17	1.1	3.47	213
January	5	1.8	3.07	189
February	94	2.6	16.7	928
March	180	12	65.1	4,000
April	215	54	83.7	4,980
May	62	7.5	25.0	1,540
June	7.5	.6	2.40	143
July	.8	.4	.52	32.0
August	.6	.3	.38	23.4
September	22	.4	2.99	178
The year	215	.3	17.2	12,500

GOODYEAR CREEK AT GOODYEAR BAR, CALIF.

LOCATION.—In W. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., at trail bridge in Tahoe National Forest, 300 feet above junction with North Fork of Yuba River and half a mile north of Goodyear Bar, Sierra County.

DRAINAGE AREA.—12.2 square miles.

RECORDS AVAILABLE.—October 30, 1910, to September 30, 1918.

GAGE.—Vertical staff fastened to an alder tree on left bank 200 feet above bridge; read by G. E. King.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Solid rock and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.7 feet April 9 (discharge, 276 second-feet); minimum stage recorded, 1.30 feet August 24 to 31 (discharge, 1.2 second-feet).

1910–1918: Maximum stage recorded, 7.0 feet at 3 p. m. December 31, 1913 (discharge, from extension of rating curve, about 1,460 second-feet); minimum stage recorded, 1.30 feet August 24 to 31, 1918 (discharge, 1.2 second-feet).

DIVERSIONS.—Three small irrigation ditches, having a total capacity of about 7½ second-feet, head above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed April 9. Rating curves fairly well defined between 2 and 200 second-feet. Gage read to half-tenths feet once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Goodyear Creek at Goodyear Bar, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 5	1.37	3.2
Sept. 28	1.57	7.9

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Daily discharge, in second-feet, of Goodyear Creek at Goodyear Bar, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.0	3.0	26	8	8	26	158	94	17	5	2.8	2.0
2	4.0	3.0	12	8	8	34	131	94	15	4.0	2.8	2.0
3	4.0	3.0	12	8	8	34	118	94	12	2.8	2.8	2.8
4	4.0	3.0	8	8	8	43	106	94	9	1.2	2.8	2.8
5	6	6	8	8	8	34	100	83	9	2.8	2.8	2.8
6	4.0	6	8	8	158	38	100	78	9	4.0	2.8	2.8
7	4.0	6	8	8	94	62	106	72	9	2.0	2.8	2.8
8	4.0	6	8	6	43	52	138	61	9	2.8	2.8	2.8
9	4.0	6	8	6	34	43	276	56	9	2.8	2.0	2.8
10	4.0	6	8	6	30	52	187	50	9	2.8	2.0	2.8
11	4.0	6	8	6	26	131	155	45	9	4.0	2.0	2.8
12	4.0	8	8	12	26	94	143	50	9	5	2.0	22
13	4.0	8	8	12	26	62	131	48	9	2.8	2.0	22
14	4.0	8	8	12	26	57	118	46	9	2.8	2.0	18
15	4.0	8	8	8	26	52	118	44	9	2.8	2.0	9
16	4.0	8	8	8	22	52	118	42	9	2.8	2.0	7
17	4.0	8	8	8	34	52	118	40	9	2.8	2.0	5
18	4.0	8	8	10	26	187	118	38	9	2.8	2.0	5
19	4.0	8	8	8	22	158	124	36	7	2.8	2.0	5
20	4.0	8	8	8	19	106	138	31	7	2.8	2.8	5
21	4.0	8	8	8	22	94	158	26	7	2.0	2.8	5
22	4.0	8	8	8	34	94	158	26	7	2.0	2.8	4.0
23	4.0	8	8	8	62	94	144	26	5	4.0	2.0	4.0
24	4.0	8	8	8	52	94	131	22	5	4.0	1.2	4.0
25	4.0	8	10	8	34	220	118	22	4.0	4.0	1.2	4.0
26	3.0	8	43	8	30	257	106	22	4.0	4.0	1.2	4.0
27	3.0	8	26	8	26	187	106	22	4.0	2.8	1.2	4.0
28	3.0	8	12	8	26	151	94	22	4.0	2.8	1.2	9
29	3.0	8	10	8	.....	151	94	22	4.0	2.8	1.2	7
30	3.0	12	8	8	.....	158	94	21	5	2.8	1.2	5
31	3.0	.....	8	8	.....	158	.....	19	.....	2.8	1.2	.....

NOTE.—Gage not read Jan. 21-26, May 13-18, May 30 to June 1, June 10-14, 20 28-30, and Sept. 21-23, discharge interpolated; April 8, 11, and 12, discharge estimated from record of flow of Oregon Creek.

Monthly discharge of Goodyear Creek at Goodyear Bar, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	6	3.0	3.87	238
November	12	3.0	7.00	417
December	43	8	10.8	664
January	12	6	8.19	504
February	158	8	33.5	1,860
March	257	26	97.6	6,000
April	276	94	130	7,740
May	94	19	46.6	2,870
June	17	4.0	8.07	480
July	5	1.2	3.08	189
August	2.8	1.2	2.08	128
September	22	2.0	5.91	352
The year	276	1.2	29.6	21,400

BEAR RIVER AT VAN TRENT, CALIF.

LOCATION.—In SE. ¼ sec. 21, T. 14 N., R. 6 E., below highway bridge at McCourtney crossing, 1 mile below Van Trent, Placer County, and 8 miles above Wheatland.

DRAINAGE AREA.—263 square miles.

RECORDS AVAILABLE.—October 8, 1904, to September 30, 1918.

GAGE.—Staff in five sections on left bank 500 feet below bridge; read by Herman Ernestus.

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DISCHARGE MEASUREMENTS.—Made from cable half a mile below gage or by wading.

CHANNEL AND CONTROL.—Solid rock, boulders and gravel; shift during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.8 feet at 8 a. m. March 19 (discharge, 4,930 second-feet); minimum stage recorded, 0.6 foot July 4 (discharge, 2 second-feet).

1904–1918: Maximum stage recorded, 18.9 feet at 8 a. m. January 14, 1909 (discharge, from extension of rating curve, about 29,600 second-feet); minimum stage recorded, 0.6 foot July 4, 1918 (discharge, 2 second-feet).

DIVERSIONS.—Water is diverted above station for power and irrigation. Stored water from South Fork of Yuba River is diverted into this drainage above the station at Colfax.

REGULATION.—A small amount of storage is developed on the headwaters of this stream. See also preceding paragraph.

ACCURACY.—Stage-discharge relation changed March 12. Rating curve used to March 12 well defined below 1,000 second-feet and extended above. Curve used after March 12 well defined below 400 second-feet and extended above. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of Bear River at Van Trent, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 7	Charles Leidl	2.08	168	July 19	Charles Leidl	0.81	8.4
May 4	do	1.78	198	Sept. 25	J. F. Kunesh	.91	14

Daily discharge, in second-feet, of Bear River at Van Trent, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	20	152	28	24	120	380	184	127	18	22	13
2	12	17	130	33	38	100	340	179	168	8	22	8
3	20	20	90	28	28	90	380	174	90	5	13	8
4	17	24	65	33	20	72	302	168	114	2	13	5
5	14	20	50	38	28	90	321	70	114	5	22	6.5
6	50	178	33	28	552	110	340	90	102	5	8	18
7	28	44	28	20	1,370	215	515	114	114	8	22	13
8	20	38	33	28	335	795	425	168	90	5	13	13
9	24	33	28	33	140	445	470	200	102	5	8	5
10	17	38	20	28	140	335	1,060	232	80	13	5	5
11	20	28	24	24	65	2,980	660	232	80	8	5	5
12	20	24	20	28	50	2,980	560	200	90	13	5	13
13	24	140	28	110	190	1,830	660	232	114	13	5	184
14	20	44	24	44	178	940	470	249	102	13	5	232
15	24	28	20	72	152	660	425	154	70	13	5	70
16	9	20	28	50	130	560	380	232	90	12	8	29
17	20	24	50	44	995	660	321	140	61	13	8	22
18	17	20	38	38	485	710	266	114	70	8	8	22
19	24	24	33	44	245	4,930	200	114	90	8	8	13
20	17	28	28	33	305	1,550	168	168	70	8	8	22
21	28	24	28	38	552	1,000	302	140	90	8	5	13
22	24	20	24	33	1,870	1,000	232	200	70	8	5	22
23	12	24	28	28	795	820	227	200	90	5	8	22
24	14	28	20	33	1,140	710	222	200	52	8	8	13
25	12	24	24	28	575	765	216	140	90	8	8	13
26	17	20	28	24	305	880	211	140	70	13	5	13
27	17	24	38	28	190	1,270	206	90	36	5	8	18
28	14	28	44	20	152	820	200	168	13	20	5	24
29	28	24	38	28	.....	820	195	154	18	22	22	29
30	12	28	33	24	.....	635	190	168	13	8	13	22
31	17	.....	38	28	.....	560	.....	114	.....	29	22	.....

NOTE.—Gage not read Apr. 23 to May 3; discharge interpolated.

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Monthly discharge of Bear River at Van Trent, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	50	9	19.7	1,210
November	178	17	35.2	2,090
December	152	20	40.8	2,510
January	110	20	35.4	2,180
February	1,870	20	395	21,900
March	4,930	72	950	58,400
April	1,060	168	361	21,500
May	249	70	165	10,100
June	168	13	82.7	4,920
July	29	2.0	10.2	627
August	22	5	10.4	639
September	282	5	29.8	1,770
The year	4,930	2.0	177	128,000

BEAR RIVER CANAL NEAR COLFAX, CALIF.

LOCATION.—Just below lower spillway gates, 1 mile below diversion dam on Bear River and 2 miles northwest of Colfax, Placer County.

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1918.

GAGE.—Bristol water-stage recorder on left bank about 800 feet below the spillway gates; installed November 23, 1916. August, 1915, the gage was moved to right side of flume about 60 feet below spillway gates about 1 mile below original gage. Original gage was float in stilling box, 750 feet below headgate.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

CHANNEL AND CONTROL.—Rectangular wooden flume. Control is a length of channel.

EXTREMES OF DISCHARGE.—1912-1918: Maximum daily discharge recorded, 256 second-feet June 3, 1917. Canal dry at times nearly every year.

COOPERATION.—Discharge record and some measurements furnished by Pacific Gas & Electric Co.

The water is used for power development and irrigation near Auburn.

Discharge measurements of Bear River canal near Colfax, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	J. F. Kunesh	3.51	113	Apr. 5	Pacific Gas & Electric Co	5.18	232
7	do	1.36	12.8	May 8	Charles Leidl	4.30	194
Nov. 30	Pacific Gas & Electric Co	4.37	177	9	Pacific Gas & Electric Co	5.42	252
30	do	5.26	236	11	do	5.39	249
Jan. 28	do	1.88	42	July 18	Charles Leidl	3.18	111
Apr. 4	do	5.20	228				

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Daily discharge, in second-feet, of Bear River canal near Colfax, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	181	197	223	99	66	180	195	240	250	138	209	88
2	216	198	169	104	69	181	214	230	232	184	209	90
3	210	181	179	87	56	159	189	216	196	160	214	156
4	226	162	185	82	57	159	219	240	248	92	121	170
5	219	224	146	85	84	177	229	236	249	112	181	176
6	210	161	161	43	191	170	239	236	248	152	207	167
7	143	175	142	94	185	196	242	215	226	114	179	186
8	208	185	121	99	168	195	246	218	246	164	185	95
9	215	167	81	99	135	188	229	239	233	170	182	83
10	209	183	101	69	97	187	235	242	226	163	191	144
11	198	168	121	84	96	185	247	239	247	167	96	196
12	208	0	135	139	91	186	248	226	246	166	176	133
13	226	52	99	65	172	174	246	240	231	165	185	199
14	120	147	123	97	170	187	244	246	244	139	206	219
15	218	170	101	80	180	194	242	244	224	157	175	82
16	208	169	118	84	158	87	235	241	245	207	208	156
17	197	152	107	85	189	0	246	248	235	186	189	132
18	239	102	145	96	182	0	246	239	252	182	83	147
19	229	192	154	76	172	0	220	237	246	169	161	95
20	202	192	87	60	78	0	243	222	252	199	147	93
21	179	174	88	80	178	0	238	249	251	96	188	145
22	199	189	104	88	158	0	228	247	233	175	178	134
23	231	159	51	77	176	0	248	250	251	181	125	72
24	175	165	53	70	184	0	246	249	148	175	184	164
25	201	120	46	75	196	0	231	233	177	169	75	148
26	188	163	121	66	184	0	220	232	197	162	153	170
27	179	180	132	45	181	0	219	222	186	180	89	139
28	123	156	93	72	162	0	219	235	242	136	104	165
29	212	180	98	84	.....	0	217	246	192	156	177	76
30	126	176	88	92	.....	172	236	231	124	178	205	98
31	194	.....	131	71	.....	167	.....	224	.....	219	183	.....

Monthly discharge of Bear River canal near Colfax, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	239	120	197	12,100
November	224	0	161	9,580
December	223	46	119	7,320
January	139	43	82.2	5,050
February	196	56	143	7,940
March	196	0	101	6,210
April	248	189	232	13,800
May	250	215	236	14,500
June	252	124	226	13,400
July	219	92	162	9,960
August	214	75	167	10,300
September	219	72	137	8,150
The year	252	0	164	118,000

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AMERICAN RIVER AND TRIBUTARIES.

NORTH FORK OF AMERICAN RIVER NEAR COLFAX, CALIF.

LOCATION.—In SW. ¼ sec. 30, T. 14 N., R. 10 E., at bridge on Colfax-Forest Hill road, 150 feet below mouth of Shirttail Canyon Creek, 5 miles southeast of Colfax, Placer County, and 11 miles above junction with Middle Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 16, 1911, to September 30, 1918.

GAGE.—Vertical staff in two sections: Section 1 bolted to ledge on left bank 30 feet below bridge; section 2 wedged in crevice on right bank 35 feet below bridge. From December 18, 1912, to August 16, 1914 a Gurley printing water-stage recorder was in operation on the right bank 50 feet below the bridge at the same datum. Gage read by H. P. Henning.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders—tailings from placer mining; shift during high water. Banks high, rocky, wooded, and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.55 feet at 6.30 p. m. April 9 (discharge, 3,310 second-feet); minimum stage recorded, 2.1 feet November 5, August 12–15, August 20–September 12 (discharge, 50 second-feet).

1911–1918: Maximum stage recorded, 16.0 feet during morning of January 1, 1914, determined by high-water mark on gage in recorder well (discharge, from extension of rating curve, about 23,000 second-feet); minimum stage recorded, 2.1 feet November 5, 1917, August 12–15, August 20–September 12, 1918 (discharge, 50 second-feet).

DIVERSIONS.—A small ditch diverts water from Lake Valley reservoir, which is on a small tributary of North Fork of American River. This water, after passing through Alta power plant, is wasted into the Bear River drainage basin.

STORAGE.—The capacity of Lake Valley reservoir is 8,000 acre-feet. See preceding paragraph.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 3,000 second-feet and extended above. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of North Fork of American River near Colfax, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 7	J. F. Kunesh	2.12	54
May 7	Charles Leidl	5.08	1,570
July 18	.....do	2.24	82

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Daily discharge, in second-feet, of North Fork of American River near Colfax, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	60	50	373	96	71	306	1,830	1,730	533	122	60	50
2	50	50	156	84	71	338	1,640	1,930	630	122	60	50
3	50	50	101	84	71	356	1,220	1,730	533	122	60	50
4	50	50	96	84	71	338	965	1,830	630	109	60	50
5	50	60	84	71	71	322	895	1,730	630	109	60	50
6	50	91	71	71	1,000	306	930	1,460	580	109	60	50
7	50	71	71	71	860	828	1,070	1,460	605	95	60	50
8	50	60	71	71	430	630	1,070	1,460	556	96	60	50
9	50	60	71	71	322	470	2,150	1,140	533	96	60	50
10	50	60	71	71	280	533	2,270	930	512	96	60	50
11	50	60	60	71	248	1,460	2,040	860	470	96	60	50
12	50	96	60	101	226	2,520	2,040	965	450	91	54	71
13	50	84	60	122	268	1,300	1,460	1,140	450	84	50	180
14	50	67	60	101	274	965	1,300	1,220	410	84	50	930
15	50	60	60	96	258	735	1,220	1,040	338	84	50	186
16	50	60	60	96	226	708	1,140	930	300	84	60	117
17	50	60	71	96	430	630	1,300	930	274	84	60	91
18	50	60	71	101	306	1,000	1,460	860	274	84	60	76
19	50	60	71	150	258	2,520	1,380	860	248	84	60	71
20	50	60	71	109	258	1,640	1,640	828	242	71	54	71
21	50	60	71	96	306	1,300	1,730	860	226	71	50	71
22	50	60	71	96	630	1,140	2,150	860	210	71	50	71
23	50	60	60	96	630	1,000	2,150	860	204	71	50	71
24	50	60	60	95	860	1,040	1,830	860	180	71	50	71
25	50	60	60	96	490	1,640	1,730	795	180	71	50	71
26	50	60	165	76	373	2,390	1,640	708	165	71	50	71
27	50	60	410	84	356	2,270	1,550	580	156	71	50	71
28	50	60	165	71	306	1,640	1,460	533	150	71	50	71
29	50	60	122	71	.....	1,460	1,550	490	144	71	50	91
30	50	60	101	71	.....	1,640	1,640	533	136	71	50	96
31	50	.....	96	71	.....	1,730	.....	680	.....	67	50	.....

Monthly discharge of North Fork of American River near Colfax, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	60	50	50.3	3,090
November	96	50	62.3	3,710
December	410	60	103	6,330
January	150	71	88.4	5,440
February	1,000	71	355	19,700
March	2,520	306	1,130	69,500
April	2,270	895	1,550	92,200
May	1,930	490	1,060	65,200
June	630	136	365	21,700
July	122	67	87.1	5,360
August	60	50	55.1	3,390
September	930	50	103	6,130
The year	2,520	50	417	302,000

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AMERICAN RIVER AT FAIROAKS, CALIF.

LOCATION.—At highway bridge 1,500 feet northwest of Southern Pacific Co.'s railroad station at Fairoaks Bridge, half a mile southeast of Fairoaks, Sacramento County, and 10 miles below mouth of South Fork.

DRAINAGE AREA.—1,910 square miles.

RECORDS AVAILABLE.—November 3, 1904, to September 30, 1918.

GAGE.—Gurley graph water-stage recorder on right bank 800 feet below bridge. A temporary vertical staff gage on right bank 60 feet above bridge was used from October 1 to February 6, February 10 to March 5, and June 19 to September 30. Previous to January 18, 1914, several staff gages at right abutment of bridge were used. From January 18, 1914, to August 24, 1916 and December 9, 1916, to July 21, 1917, the record is from a Gurley printing water-stage recorder at same site as present gage. A temporary gage was used when recorder could not be operated.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year not recorded; minimum stage, 0.3 foot on temporary gage August 12 to September 12 (discharge, 65 second-feet).

1907–1918: Maximum stage recorded, 30.4 feet March 19, 1907 (discharge, from extension of rating curve, about 119,000 second-feet); minimum stage recorded, 2.01 feet from 8 to 10.30 a. m. September 24, 1915 (discharge, from extension of low-water curve, 25 second-feet). Lower stages at various other times have given larger discharges.

DIVERSIONS.—Water is diverted for irrigation above station.

REGULATION.—See descriptions of Middle, North, and South forks. Low-water flow partly regulated by power plant at Folsom.

ACCURACY.—Stage-discharge relation changed February 7, and some time during May. Sand bar interfered with operation of recorder from October 1 to March 4, and June 19 to September 30. The temporary staff gage was read at these times. Rating curves are fairly well defined. Mean daily gage height determined by inspecting the recorder graph or by averaging daily readings. Daily discharge ascertained by applying mean daily gage height to rating table. For periods when recorder was not running (see footnote to daily-discharge table) discharges estimated from flow of the North, South, and Middle forks. Records fair.

Discharge measurements of American River at Fairoaks, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 17	F. F. Kunesh	[a] 3.57	1,950	June 30	F. F. Kunesh	[a] 1.71	587
Mar. 6	Charles Leidl	[b] 2.62	1,330	July 16	Charles Leidl	[a] .82	203
8	do	[b] 4.32	5,070	17	do	[a] 1.10	320
Apr. 1	do	[b] 5.22	7,670	Aug. 2	J. F. Kunesh	[a] .62	128
May 3	do	[b] 5.37	8,760				

[a] Gage height read from temporary gage.
[b] Gage height read from gage in recorder well.

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Daily discharge, in second-feet, of American River at Fairoaks, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	June.	July.	Aug.	Sept.
1	150	202	202	260	260	2,470	8,120	.....	875	95	65
2	260	150	1,570	290	325	2,470	8,150	.....	690	97	65
3	196	230	1,430	290	260	2,720	6,410	.....	525	95	65
4	150	150	1,220	230	150	2,560	4,730	.....	550	75	65
5	260	202	1,100	325	230	1,580	4,020	.....	475	65	65
6	202	175	910	260	1,100	1,370	3,750	.....	425	75	65
7	150	290	652	325	7,400	2,980	3,920	.....	525	75	65
8	202	150	398	435	6,850	5,570	4,500	.....	450	75	65
9	175	175	290	325	7,170	2,730	5,590	.....	380	75	65
10	202	230	325	290	2,640	2,350	12,400	.....	340	65	65
11	150	150	230	398	2,560	.....	11,800	.....	380	75	65
12	150	202	260	360	2,640	.....	11,000	.....	360	65	65
13	202	125	290	260	2,310	.....	10,200	.....	340	65	320
14	150	202	202	325	1,840	.....	.....	1,790	380	65	3,000
15	150	202	398	325	2,390	.....	.....	1,720	360	65	1,980
16	125	150	150	202	2,390	.....	.....	1,630	324	65	1,330
17	230	125	230	175	1,920	.....	.....	1,490	340	65	1,330
18	175	150	175	398	1,920	.....	.....	1,310	280	65	400
19	150	125	290	325	1,760	.....	.....	1,250	300	65	320
20	230	175	325	202	1,920	.....	.....	1,200	300	65	280
21	202	202	435	175	1,990	.....	.....	1,140	280	65	280
22	66	150	325	202	1,550	.....	.....	1,080	200	65	280
23	175	125	398	360	1,550	.....	.....	1,020	118	65	320
24	260	150	435	325	1,690	.....	.....	964	118	65	320
25	290	325	325	260	1,620	.....	.....	906	118	65	160
26	202	202	515	360	1,480	.....	.....	848	118	65	160
27	230	175	910	150	2,230	.....	.....	790	95	65	280
28	150	175	750	175	2,390	.....	.....	733	95	65	280
29	202	230	700	202	.....	.....	.....	675	95	65	320
30	150	150	260	260	.....	.....	.....	617	75	65	320
31	150	.....	435	325	.....	8,010	.....	.....	95	65	.....

NOTE.—Discharge for periods in which gage was not read obtained as follows: Mar. 11 to 30, estimated as 6,150 second-feet; Apr. 14–30, estimated as 7,500 second-feet; May 1–31, estimated as 5,000 second-feet; June 1–13, estimated as 3,000 second-feet; June 19–29, interpolated; Sept. 14, estimated.

Monthly discharge of American River at Fairoaks, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	290	66	185	11,400
November	325	125	181	10,800
December	1,570	150	520	32,000
January	435	150	284	17,500
February	7,400	150	2,230	124,000
March	.....	.....	5,090	313,000
April	.....	.....	7,400	440,000
May	.....	.....	[a]5,000	307,000
June	.....	617	1,940	115,000
July	875	75	322	19,800
August	97	65	69.9	4,300
September	3,000	65	415	24,700
The year	.....	65	1,960	1,420,000

[a] Estimated.

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MIDDLE FORK OF AMERICAN RIVER NEAR EAST AUBURN, CALIF.

LOCATION.—In SE. ¼ sec. 6, T. 12 N., R. 9 E., at Mountain Quarry Co.'s plant, about 1½ miles above junction with North Fork of American River and 3½ miles northeast of East Auburn, Placer County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 22, 1911, to September 30, 1918.

GAGE.—Staff in three sections on left bank at pump house; read by J. A. Collins.

DISCHARGE MEASUREMENTS.—Made from cable 700 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.0 feet at 8 a. m. April 10 (discharge, 6,100 second-feet); minimum stage recorded, 2.4 feet August 25 to September 11 (discharge, 56 second-feet).

1911-1918: Maximum stage recorded, 18.0 feet at 7 a. m. January 1, 1914 (discharge, from extension of rating curve, about 26,400 second-feet); minimum stage recorded, 1.0 foot at 7 a. m. October 23, 24, and 31, 1915 (discharge, 32 second-feet).

DIVERSIONS.—Pilot Creek ditch diverts from Pilot Creek for irrigation on Georgetown divide. Little South Fork ditch diverts from Gerle Creek and discharges into Pilot Creek drainage basin, where it is used when necessary to supplement the flow in Pilot Creek ditch; its maximum discharge is probably less than 20 second-feet.

REGULATION.—Storage is developed in Loon Lake at the head of Gerle Creek to serve the ditches mentioned in the preceding paragraph.

ACCURACY.—Stage-discharge relation changed April 9. Rating curve used October 1 to April 9, well defined below 7,000 second-feet. Curve used April 10 to September 30 fairly well defined below 5,000 second-feet; curves merge into one above 7,800 second-feet; extended above 7,000 second-feet. Gage read to tenths once daily; oftener during high water. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Middle Fork of American River near East Auburn, Calif., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 8	J. F. Kunesh	1.67	72
May 17	Charles Leidl	6.28	3,200
July 18	do	2.68	121

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Daily discharge, in second-feet, of Middle Fork of American River near East Auburn, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	88	198	286	230	163	492	3,510	4,110	1,600	320	87	56
2	88	142	545	214	155	518	3,120	4,410	[b]1,750	320	75	56
3	88	142	230	198	155	572	2,200	3,960	1,800	320	75	56
4	88	142	248	168	155	600	2,100	4,410	1,800	[a]275	75	56
5	82	119	198	168	155	628	2,000	3,960	1,800	230	75	56
6	78	174	198	168	1,270	655	1,520	3,250	1,800	193	75	56
7	78	198	198	168	2,100	1,200	1,700	3,250	[b]1,650	186	75	56
8	78	142	163	168	905	1,120	2,200	3,250	1,400	176	75	56
9	78	119	142	168	492	775	3,000	3,110	1,600	176	75	56
10	78	119	142	168	545	745	5,050	2,110	1,600	165	75	56
11	78	[a]130	142	168	545	1,700	4,110	1,900	1,500	158	71	56
12	78	142	130	168	545	5,460	3,810	[b]2,300	1,900	158	66	71
13	78	168	124	327	545	2,100	3,530	2,720	1,900	142	66	127
14	78	142	119	230	[a]572	1,440	3,530	2,590	1,800	142	66	1,010
15	78	130	119	230	545	1,200	2,230	2,470	1,400	133	66	750
16	78	119	[a]138	230	545	1,200	2,000	2,000	1,300	127	66	370
17	78	119	155	230	572	[a]1,200	2,470	2,000	965	127	66	230
18	78	119	142	214	600	1,200	2,850	2,110	875	127	66	186
19	78	108	142	230	600	4,050	2,720	2,000	790	121	66	158
20	78	98	142	230	518	2,530	2,980	2,110	750	113	66	127
21	78	98	142	224	545	1,900	[b]3,470	2,230	710	[a]106	66	127
22	78	98	142	214	1,040	1,700	4,110	2,230	635	99	66	127
23	78	98	142	198	840	1,700	4,570	2,230	600	99	66	127
24	78	98	142	198	1,520	1,610	3,960	2,110	570	99	66	127
25	78	98	[a]170	198	808	2,100	3,960	2,110	450	99	56	127
26	78	98	198	198	545	3,250	4,110	1,800	420	99	56	127
27	78	98	808	198	545	4,050	3,530	1,600	420	99	56	121
28	78	98	572	192	492	2,760	3,530	1,400	395	87	56	113
29	78	[a]98	306	174	.....	2,420	3,530	1,300	370	87	56	133
30	94	98	348	168	.....	2,310	3,810	1,200	345	87	56	158
31	204	.....	348	168	.....	3,510	.....	1,600	.....	87	56	.....

[a] No gage-height record; discharge interpolated.
[b] No gage-height record, discharge estimated from flow of North and South forks of American River.

Monthly discharge of Middle Fork of American River near East Auburn, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	204	78	84.0	5,160
November	198	98	125	7,440
December	808	119	226	13,900
January	327	168	200	12,300
February	2,100	155	643	35,700
March	5,460	492	1,830	113,000
April	5,050	1,520	3,170	189,000
May	4,410	1,200	2,510	154,000
June	1,900	345	1,160	69,000
July	320	87	153	9,410
August	87	56	67.2	4,130
September	1,010	56	164	9,760
The year	5,460	56	860	623,000

SOUTH FORK OF AMERICAN RIVER NEAR PLACERVILLE, CALIF.

LOCATION.—In SE. ¼ sec. 26, T. 11 N., R. 10 E., below bridge at Chili Bar, on Placerville-Georgetown road, about 1,000 feet below Big Canyon Creek and 3 miles northwest of Placerville, Eldorado County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 11, 1911, to September 30, 1918.

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GAGE.—Staff in 2 sections bolted to solid rock on right bank about 1,000 feet below bridge; high-water section painted on the rocks above second section. Gage read by John Hutter and Anna Schmook.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.3 feet at 9 a. m. March 12 (discharge, 5,430 second-feet); minimum stage recorded, 3.31 feet at 7.45 a. m. August 27 (discharge, 50 second-feet).

1911–1918: Maximum stage recorded, 19.0 feet at 4 p. m. January 25, 1914 (discharge, form extension of rating curve, about 15,000 second-feet); minimum stage recorded, 3.31 feet at 7.45 a. m. August 27, 1918 (discharge, 50 second-feet).

DIVERSIONS.—Just below the mouth of Silver Fork, water is diverted for irrigation, mining, and the municipal supply for Placerville. Power is developed near the mouth of Rock Creek by the Western States Gas & Electric Co. At low water the entire flow of the South Fork of American River is diverted for power; occasionally the quantity is insufficient and additional water is purchased from the Sierra Water Supply Co. The water diverted for power is returned to the river above the gaging station.

REGULATION.—Echo and Silver lakes are used as storage reservoirs.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 5,000 second-feet and extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records excellent.

The following discharge measurement was made by J. F. Kuneah:

October 10, 1917: Gage height, 3.72 feet; discharge, 101 second-feet.

Daily discharge, in second-feet, of South Fork of American River near Placerville, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	118	72	170	154	103	341	2,200	3,640	2,040	295	86	51
2	115	79	377	146	115	359	2,370	3,640	2,200	268	85	54
3	118	86	214	143	124	377	1,880	3,640	2,200	257	85	59
4	112	78	170	133	110	415	1,590	4,550	2,370	257	80	54
5	108	72	146	130	115	455	1,520	4,040	2,370	235	76	53
6	115	130	143	128	280	377	1,450	3,450	2,370	214	72	51
7	127	130	130	130	1,590	1,080	1,590	3,450	2,370	195	67	54
8	108	115	127	133	500	1,020	1,730	3,540	2,370	178	65	60
9	124	103	115	146	377	745	2,040	2,550	2,370	162	62	64
10	103	86	115	154	359	590	3,360	2,040	2,200	154	58	67
11	92	100	115	124	280	1,590	3,090	1,880	2,040	146	60	68
12	124	127	109	115	257	5,430	2,910	2,460	2,040	144	61	64
13	94	127	108	195	415	2,120	2,820	2,910	2,040	133	54	138
14	130	112	106	162	590	1,450	2,200	3,270	2,370	128	51	800
15	89	106	103	162	415	1,020	1,960	2,460	1,800	112	51	690
16	83	103	110	162	246	1,080	2,040	2,040	1,450	103	64	341
17	92	100	115	154	640	1,020	2,200	2,280	1,320	96	68	195
18	118	100	130	143	396	1,080	2,640	2,200	1,200	87	71	162
19	86	94	143	146	257	3,270	2,550	2,370	1,020	89	67	140
20	78	93	138	162	280	2,040	2,910	2,640	965	92	65	127
21	78	93	136	162	377	1,590	3,270	2,550	855	89	66	122
22	79	92	133	130	1,200	1,450	3,740	2,370	745	86	64	127
23	106	92	127	122	665	1,380	3,940	2,550	665	100	60	127
24	112	89	115	121	1,450	1,320	3,740	2,460	640	103	59	146
25	112	93	115	127	690	1,450	3,540	2,280	568	102	53	130
26	97	92	143	121	500	1,660	3,450	1,960	500	100	52	138
27	75	93	224	115	435	2,730	3,090	1,590	455	97	50	130
28	72	94	280	109	377	2,040	3,000	1,380	415	90	56	112
29	75	96	214	127	.....	1,800	3,360	1,320	359	89	53	136
30	70	94	178	130	.....	1,880	3,270	1,450	310	86	51	136
31	70	.....	162	114	.....	2,120	.....	1,880	.....	86	51	.....

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Monthly discharge of South Fork of American River near Placerville, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	130	70	99.4	6,110
November	130	72	98.0	5,830
December	377	108	152	9,350
January	195	109	139	8,550
February	1,590	103	469	26,000
March	5,430	341	1,460	89,800
April	3,940	1,450	2,650	158,000
May	4,550	1,320	2,610	160,000
June	2,370	310	1,490	88,700
July	295	86	141	8,670
August	86	50	63.3	3,890
September	800	51	153	9,100
The year	5,430	50	793	574,000

CACHE CREEK BASIN.

CLEAR LAKE AT LAKEPORT, CALIF.

LOCATION.—At municipal wharf on north side of Third Street at Lakeport, Lake County.

RECORDS AVAILABLE.—February 25, 1913, to September 30, 1918.

GAGE.—Vertical staff fastened to piling at municipal wharf; read once a day by C. J. Borghi.

EXTREMES OF STAGE.—Maximum stage recorded during year, 3.03 feet April 10–14; minimum stage recorded, —1.70 feet September 29.

1913–1918: Maximum stage recorded, 11.12 feet January 28, 1914; minimum stage recorded, —1.70 feet September 29, 1918.

COOPERATION.—Gage-height record furnished by Yolo Water & Power Co.

Daily gage height, in feet, of Clear Lake at Lakeport, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.13	0.73	0.62	0.80	0.88	1.88	2.93	2.90	1.98	1.10	−0.07	−1.17
2	1.10	.73	.65	.80	.90	1.85	2.92	2.88	1.96	1.07	− .10	−1.20
3	1.08	.72	.67	.78	.90	1.85	2.92	2.82	1.94	1.02	− .15	−1.24
4	1.08	.72	.70	.78	.90	1.87	2.93	2.75	1.90	1.00	− .18	−1.27
5	1.08	.70	.67	.78	.90	1.87	2.93	2.73	1.88	.98	− .21	−1.30
6	1.05	.70	.65	.80	1.02	1.88	2.77	2.74	1.86	.96	− .25	−1.30
7	1.03	.70	.65	.80	1.10	1.92	2.97	2.74	1.83	.91	− .30	−1.33
8	1.00	.70	.65	.78	1.10	1.92	2.97	2.70	1.80	.87	− .33	−1.35
9	1.00	.70	.65	.80	1.12	1.92	3.02	2.67	1.78	.83	− .36	−1.39
10	1.00	.70	.63	.80	1.15	1.95	3.03	2.63	1.75	.78	− .39	−1.43
11	1.00	.70	.63	.80	1.17	.....	3.03	2.58	1.72	.75	− .44	−1.47
12	.98	.71	.63	.80	1.15	2.08	3.03	2.60	1.69	.70	− .48	−1.50
13	.96	.71	.65	.82	1.12	2.12	3.03	2.45	1.64	.68	− .53	−1.40
14	.94	.71	.62	.85	1.15	2.18	3.03	2.48	1.60	.65	− .58	−1.38
15	.92	.70	.62	.88	1.17	2.22	3.00	2.48	1.58	.60	− .62	−1.33
16	.90	.70	.61	.88	1.18	2.22	3.02	2.45	1.55	.58	− .66	−1.40
17	.89	.68	.63	.90	1.30	2.25	3.02	2.40	1.52	.50	− .70	−1.43
18	.88	.67	.65	.90	1.38	2.32	3.01	2.37	1.45	.48	− .74	−1.45
19	.88	.67	.64	.90	1.35	2.38	2.97	2.35	1.41	.42	− .77	−1.48
20	.85	.67	.64	.90	1.45	2.46	3.00	2.30	1.40	.38	− .80	−1.50
21	.82	.67	.65	.90	1.50	2.50	3.00	2.30	1.39	.33	− .83	−1.52
22	.80	.67	.65	.88	1.55	2.55	3.00	2.27	1.35	.28	− .87	−1.56
23	.78	.64	.65	.88	1.65	2.60	3.00	2.25	1.33	.25	− .90	−1.60
24	.78	.62	.65	.88	1.75	2.67	2.97	2.20	1.30	.23	− .93	−1.62
25	.77	.62	.70	.88	1.78	2.70	2.95	2.18	1.28	.20	− .95	−1.63
26	.77	.62	.75	.88	1.80	2.78	2.95	2.20	1.24	.17	− .97	−1.65
27	.77	.62	.80	.88	1.88	2.82	2.95	2.13	1.20	.12	−1.00	−1.67
28	.76	.62	.80	.88	1.88	2.88	2.95	2.10	1.17	.08	−1.07	−1.68
29	.75	.62	.78	.88	.....	2.92	2.90	2.05	1.15	.05	−1.09	−1.70
30	.75	.62	.80	.88	.....	2.92	2.90	2.05	1.12	.00	−1.10	.....
31	.73	.....	.80	.88	.....	2.93	.....	2.02	.....	− .03	−1.13	.....

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CACHE CREEK AT YOLO, CALIF.

LOCATION.—A highway bridge half a mile south of Yolo, Yolo County, in Río Jesús María grant, 1,000 feet above Southern Pacific Co.'s railroad bridge.

DRAINAGE AREA.—1,320 square miles.

RECORDS AVAILABLE.—January 1, 1903, to September 30, 1918.

GAGE.—Staff in four sections; lower section vertical, fastened to pile under bridge near left bank; second section, inclined, right bank, 30 feet above bridge; third section, vertical, fastened to cottonwood tree on right bank 70 feet above bridge; upper section, vertical, fastened to upper end of right abutment. This gage was installed October 2, 1904, at the same datum as original gage on upstream side of right pier of bridge. Gage read by Mrs. Cornelia W. Bigelow.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year, 3.9 feet at 8 a. m. February 24 (discharge, 1,170 second-feet); no flow April 23 to May 9 and May 31 to Sept. 12.

1903–1918: Maximum stage recorded, 27.8 feet at 5 p. m. February 2, 1915 (discharge, 21,100 second-feet); no flow for periods in nearly every year.

DIVERSIONS.—Numerous ditches divert water for irrigation above the station.

REGULATION.—At low water channel is sometimes deepened at Lower Lake in order to increase the flow from lake.

ACCURACY.—Stage-discharge relation changed February 24 and March 19. Rating curve used up to February 24 well defined; that used from February 25 to March 19, poorly defined; that used from March 19 to September 30, fairly well-defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent up to February 24, poor from February 25 to March 19, and fair from March 19 to September 30.

Discharge measurements of Cache Creek at Yolo, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Mar. 8	0.69	19
May 2	.....	0

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Daily discharge, in second-feet, of Cache Creek at Yolo, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Sept.
1	9	23	20	16	16	110	148	.....	.....
2	22	23	20	20	16	83	105	.....	.....
3	23	27	20	20	16	63	85	.....	.....
4	20	31	20	20	16	34	73	.....	.....
5	27	31	20	20	14	28	65	.....	.....
6	27	31	20	20	14	21	58	.....	.....
7	27	27	20	20	153	17	51	.....	.....
8	22	27	23	20	270	27	45	.....	.....
9	14	27	23	20	162	27	45	.....	.....
10	4.6	25	23	23	105	39	45	12	.....
11	12	22	20	23	73	78	39	5.5	.....
12	23	12	20	20	46	443	34	2.5	.....
13	23	11	20	16	36	348	30	2.5	32
14	17	7	20	16	29	249	30	1.4	68
15	20	5.5	20	16	16	174	26	.3	41
16	7	5.5	20	16	12	117	26	.1	30
17	8	5.5	20	16	15	105	21	.1	30
18	31	16	23	16	210	90	15	.1	26
19	31	16	23	16	198	920	9.5	.1	9.5
20	14	23	23	16	204	620	7.5	.1	9.5
21	4	20	23	16	220	406	6.5	.1	9.5
22	4	20	23	16	451	288	.7	.3	12
23	4	20	20	16	522	230	.....	.3	15
24	4	23	20	16	995	204	.....	.3	11
25	4	22	20	16	620	190	.....	.3	9.5
26	9	16	20	16	348	345	.....	.3	15
27	7	16	20	22	239	345	.....	.3	15
28	4	16	20	23	174	270	.....	2.5	15
29	20	20	16	20	.....	236	.....	2.5	15
30	20	20	16	16	.....	220	.....	2.1	15
31	20	.....	16	16	.....	198	.....	.0	.....

NOTE.—No flow Apr. 23 to May 9 and May 31 to Sept. 12.

Monthly discharge of Cache Creek at Yolo, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	31	4	15.5	953
November	31	5.5	19.6	1,170
December	23	16	20.4	1,250
January	23	16	18.2	1,120
February	995	12	185	10,300
March	920	17	210	12,900
April	148	0	32.2	1,920
May	12	0	1.09	67
September	68	0	12.6	750
The year	995	0	42.1	30,400

PUTAH CREEK BASIN.

PUTAH CREEK AT WINTERS, CALIF.

LOCATION.—Just below Southern Pacific Co.'s railroad bridge at Winters, Yolo County, in Rio de los Putos grant.

DRAINAGE AREA.—805 square miles.

RECORDS AVAILABLE.—September 26, 1905, to September 30, 1918.

GAGE.—Staff in five sections on left bank, 600 feet below bridge; read by Miss Velma Wyatt. An auxiliary vertical staff on right bank is used for low water. Original datum has been maintained.

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DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting. Two channels at low water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.8 feet at 11 a. m. March 19 (discharge, 3,790 second-feet); no flow July 7 to September 30.

1905–1918: Maximum stage recorded, 39.0 feet December 31, 1913, from flood marks at gage (discharge, from extension of rating curve, about 60,000 second-feet); no flow during part of the years ending September 30, 1913, 1914, and 1918.

DIVERSIONS.—There are several small diversions for irrigation above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed February 23. Curves are well defined below 200 second-feet and extended above. Gage read to hundredths once daily and occasionally twice daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of Putah Creek at Winters, Calif., during the year ending Sept. 30, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Mar. 9	5.01	154
May 2	4.41	53
July 16	.....	0

Daily discharge, in second-feet, of Putah Creek at Winters, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	1.4	2.2	3.0	26	13	300	340	58	8	0.9
2	1.4	3.0	5.5	22	13	265	265	52	8	.7
3	1.2	3.7	3.7	18	12	232	235	46	6.5	.5
4	1.2	3.9	3.2	18	12	201	235	41	6.0	.5
5	.9	4.2	3.0	18	13	179	216	41	5.5	.7
6	.8	1.5	3.0	15	22	173	201	40	4.6	.2
7	.8	2.7	3.7	15	1,930	170	187	36	3.5	.....
8	.8	2.2	4.2	15	728	160	187	34	3.5	.....
9	.8	4.2	4.6	12	460	148	187	36	4.6	.....
10	1.2	3.0	4.8	12	186	144	195	32	2.4	.....
11	1.2	4.6	4.8	12	153	402	179	32	1.8	.....
12	.8	4.6	4.8	15	125	1,190	160	32	1.5	.....
13	1.0	1.8	5.0	14	104	1,190	138	32	1.3	.....
14	1.0	3.0	5.5	16	98	700	128	28	1.3	.....
15	1.6	3.9	5.5	24	89	475	119	28	2.2	.....
16	2.2	1.8	5.5	26	81	320	110	24	2.4	.....
17	2.2	3.0	5.5	39	1,770	300	110	17	2.4	.....
18	1.5	3.7	6.0	35	1,130	340	98	20	1.3	.....
19	1.5	1.6	6.0	30	570	3,190	93	20	1.3	.....
20	1.5	1.6	5.5	26	570	1,190	93	18	1.3	.....
21	1.5	4.2	5.5	22	1,050	825	86	16	1.3	.....
22	2.0	4.2	5.5	21	1,530	640	78	14	1.3	.....
23	2.6	4.2	6.0	18	2,470	580	78	14	1.3	.....
24	2.6	4.2	5.5	18	2,500	525	77	14	1.3	.....
25	1.9	4.2	7.5	18	1,190	760	71	12	1.3	.....
26	1.4	4.4	12	18	825	1,350	71	14	1.3	.....
27	1.5	2.4	10	15	640	1,190	67	12	.9	.....
28	1.5	4.4	320	14	475	760	64	11	.9	.....
29	1.0	2.7	98	14	.....	640	62	9.5	.9	.....
30	1.5	4.4	81	13	.....	525	58	9	.9	.....
31	1.5	.....	36	13	.....	432	.....	8	.....	.....

NOTE.—Gage not read Oct. 15, 22, and 25; discharge interpolated. Creek dry July 7 to Sept. 30.

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Monthly discharge of Putah Creek at Winters, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2.6	0.8	1.42	87.3
November	4.6	1.5	3.32	198
December	320	3.0	21.9	1,350
January	39	12	19.1	1,170
February	2,500	12	670	37,200
March	3,190	144	629	38,700
April	340	58	140	8,330
May	58	8	25.8	1,590
June	8	.9	2.69	160
July	.9	.0	.11	6.8
The year	3,190	.0	123	88,800

EEL RIVER BASIN.

EEL RIVER AT SCOTIA, CALIF.

LOCATION.—In sec. 18, T. 1 N., R. 1 E., at Wildwood Bridge, about half a mile northeast of Scotia, Humboldt County. Laribee Creek enters 14 miles above and Van Duzen River 7 miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 15, 1910, to February 6, 1915; October 1, 1916, to September 30, 1918.

GAGE.—Staff gage in eight sections, read by James C. Bixler. Section No. 1 is spiked to old cofferdam on northeast corner of footing of middle pier; No. 2 is painted on upstream and south corner of middle pier; No. 3 is painted on downstream and north face of footing of south pier; No. 4 is painted on vertical form brace at downstream end of south pier; No. 5 is painted on downstream face of south pier; No. 6 is painted on vertical post of first wooden bent of trestle; No. 7 painted on vertical post of second bent of trestle; No. 8 painted on vertical post of third bent of trestle. Former gages at this station were destroyed when suspension bridge was built in 1914 and when it was destroyed in 1915. The original datum has not been maintained but the new datum probably does not differ more than a few tenths of a foot from the original.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Solid rock and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 27.7 feet at 12.30 a. m. February 7 (discharge, 78,600 second-feet); minimum stage recorded, 9.4 feet August 23 to September 7 and September 10 to 12 (discharge, 50 second-feet).

1911–1918: Maximum stage recorded, 55.5 feet February 2, 1915 (discharge, from extension of rating curve, about 290,000 second-feet); minimum stage recorded, 9.4 feet August 23 to September 7 and September 10 to 12, 1918 (discharge, 50 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined below 120,000 second-feet extended above. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

The following discharge measurement was made by J. F. Kunesh:

August 28, 1918: Gage height, 9.43 feet; discharge, 56 second-feet.

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Daily discharge, in second-feet, of Eel River at Scotia, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	100	70	11,700	2,340	1,040	6,030	9,510	2,030	680	150	80	50
2	100	70	8,070	1,840	1,150	5,400	8,430	1,940	630	141	74	50
3	90	90	4,790	1,490	1,330	4,790	7,020	1,840	600	135	70	50
4	90	130	1,940	1,180	2,230	5,090	6,030	1,750	580	122	70	50
5	90	173	1,330	1,110	4,790	4,790	5,400	1,660	535	110	70	50
6	90	245	1,110	1,110	37,500	3,940	4,790	1,660	535	106	66	50
7	90	255	886	1,150	53,600	3,670	4,220	1,660	490	100	60	50
8	90	230	735	1,180	22,600	3,670	4,220	1,490	472	100	60	52
9	90	197	660	1,180	14,600	3,670	18,500	1,490	445	100	60	52
10	90	197	600	1,150	8,790	3,670	20,100	1,330	445	110	60	50
11	90	255	562	1,110	6,680	5,090	13,100	1,330	400	110	60	50
12	90	472	535	1,150	5,400	16,500	9,510	1,180	400	110	60	50
13	90	850	535	2,680	6,030	20,100	8,430	1,150	360	100	60	62
14	90	680	508	4,790	12,400	14,200	7,370	1,110	360	100	60	120
15	80	600	490	6,680	11,000	11,000	6,030	1,070	360	100	60	115
16	80	580	445	4,790	11,300	8,790	5,400	1,040	320	100	60	110
17	80	562	445	3,670	31,500	8,430	5,090	1,040	320	100	60	120
18	80	472	445	3,670	24,300	14,600	4,500	975	320	100	60	115
19	80	336	630	4,790	14,600	27,000	4,220	975	307	100	60	104
20	80	288	814	3,940	10,600	18,500	3,670	910	288	100	60	100
21	80	268	735	3,160	8,070	12,800	3,670	886	288	100	60	118
22	80	245	680	2,560	6,680	11,700	3,410	850	268	100	50	112
23	80	205	630	2,230	6,030	10,200	3,160	850	255	100	50	106
24	80	197	580	2,030	12,800	9,510	2,920	850	230	94	50	102
25	80	185	580	1,840	12,400	21,800	2,920	790	215	90	50	98
26	80	185	6,350	1,660	9,150	24,300	2,680	790	205	90	50	96
27	80	197	18,100	1,490	7,720	18,500	2,680	790	185	90	50	90
28	74	205	11,000	1,330	6,680	14,200	2,560	735	185	90	50	90
29	70	215	6,350	1,180	.....	11,700	2,450	735	165	86	50	86
30	70	4,220	3,670	1,110	.....	10,200	2,230	735	165	80	50	82
31	70	.....	2,920	1,070	.....	9,510	.....	680	.....	80	50	.....

Monthly discharge of Eel River at Scotia, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	100	70	84.0	5,160
November	4,220	70	429	25,500
December	18,100	445	2,870	176,000
January	6,680	1,070	2,280	140,000
February	53,600	1,040	12,500	694,000
March	27,000	3,670	11,100	683,000
April	20,100	2,230	6,140	365,000
May	2,030	680	1,170	71,900
June	680	165	367	21,900
July	150	80	103	6,330
August	80	50	59.0	3,630
September	120	50	81.0	4,820
The year	53,600	50	3,040	2,200,000

MIDDLE EEL RIVER NEAR COVELO, CALIF.

LOCATION.—In E. ½ sec. 36, T. 23 N., R. 12 W., near Covelo ranger station, and 6 miles east of Covelo, Mendocino County. Williams Creek enters half a mile above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 22, 1911, to September 30, 1918.

GAGE.—Staff in two sections on left bank, about one-fourth mile west of ranger station and 1 mile below bridge; read by C. V. Brereton. Several changes in sections have been made but original location and datum have been maintained.

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DISCHARGE MEASUREMENTS.—Made from cable installed December 8, 1913, 300 feet above gage.

CHANNEL AND CONTROL.—Small boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.0 feet February 6 (discharge, from extension of rating curve, about 10,000 second-feet); minimum stage, unknown; incomplete record.

1911–1918: Maximum stage recorded, between 30 and 31 feet at 4.30 p. m. December 31, 1913 (discharge, between 41,500 and 47,100 second-feet). Water overtopped gage and washed out high-water section. Minimum stage recorded, 6.9 feet at 8 a. m. September 12, 1915 (discharge, 2.5 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 8,000 second-feet and is extended above. Gage read to tenths once daily. Daily discharge ascertained by applying gage-height to rating table. Records good except for extreme high water which are fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was made by J. F. Kunesh:

August 26, 1918: Gage height, 7.02 feet; discharge, 3.6 second-feet.

Daily discharge, in second-feet, of Middle Eel River, near Covelo, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	9.5	9.5	1,680	235	155	630	2,100
2	9.5	9.5	422	206	155	630	1,910
3	9.5	9.5	422	179	134	753	1,730
4	9.5	12	337	179	115	885	1,550
5	9.5	12	266	179	573	954	1,360
6	9.5	15	206	179	8,090	818	1,180
7	9.5	15	155	179	2,070	754	2,910
8	9.5	12	155	179	1,260	690	4,640
9	9.5	12	115	179	1,020	519	4,490
10	9.5	22	85	179	885	519	2,730
11	9.5	22	85	179	630	954	2,480
12	9.5	155	63	206	630	1,590	2,240
13	9.5	99	54	337	690	1,180	2,000
14	9.5	54	54	422	630	1,180	1,750
15	9.5	40	54	300	573	1,180	1,510
16	9.5	40	54	378	818	1,180	1,260
17	9.5	35	54	469	1,340	1,340	1,020
18	9.5	35	54	1,200	630	2,610	1,020
19	9.5	35	54	1,180	519	2,070	998
20	9.5	35	54	1,100	519	1,590	976
21	9.5	35	54	954	519	1,310	954
22	9.5	35	54	885	469	2,070	927
23	9.5	30	54	753	573	3,090	900
24	9.5	30	54	630	573	5,960	872
25	9.5	26	54	469	469	6,300	845
26	9.5	26	2,610	422	573	2,970	818
27	9.5	22	1,260	378	630	2,850	.....
28	9.5	22	235	337	630	2,850	.....
29	9.5	26	155	266	.....	2,730	.....
30	9.5	722	155	206	.....	2,610	.....
31	9.5	.....	73	134	.....	2,280	.....

NOTE.—No record Mar. 8, Apr. 1–5, 7, 11–16, 19–20, and 22–25; discharge estimated from flow of Eel River at Scotia. No gage-height record Apr. 27 to Sept. 30.

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Monthly discharge of Middle Eel River near Covelo, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9.5	9.5	9.50	584
November	722	9.5	55.1	3,280
December	2,610	54	296	18,200
January	1,260	134	424	26,100
February	8,090	115	924	51,300
March	6,300	519	1,840	113,000
April 1 to 26	4,640	818	1,740	89,700
The period				302,000

KLAMATH RIVER BASIN.

WILLIAMSON RIVER NEAR SILVER LAKE, OREG.

LOCATION.—In sec. 14, T. 30 S., R. 10 E., at Beckley ranch, 1 mile east of road from Klamath Falls to Silver Lake, about 42 miles from Silver Lake. Station is in Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 25, 1917, to September 30, 1918.

GAGE.—Vertical staff on south abutment of wagon bridge. Gage readers, Earl Powers and Mrs. James Beckley.

DISCHARGE MEASUREMENTS.—Made from foot log about 200 feet above gage; current sluggish; conditions fair.

CHANNEL AND CONTROL.—Stream bed of firm sand and clay, covered during summer with growths of aquatic plants; no defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 1.10 feet October 13, 14, November 30 and December 1 (no discharge computed). Maximum discharge 88 second-feet, March 19 (gage height 1.00 foot); minimum discharge recorded during year 50 second-feet, June 30 (gage height 0.68 foot).

ICE.—Stream freezes during winter; records suspended.

DIVERSIONS.—A few hundred acres are irrigated from Williamson River and tributaries above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation unstable owing to growth of aquatic plants. Daily discharge ascertained by shifting-control method. Gage read once a day to hundredths. Records fair.

Discharge measurements of Williamson River near Silver Lake, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 5	R. C. Briggs	0.67	67	June 6	R. C. Briggs	0.83	61
30	Briggs and Henshaw	.67	62	July 30	do	.87	56
May 8	R. C. Briggs	.77	64				

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Daily discharge, in second-feet, of Williamson River near Silver Lake, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	69	69	62	61	51	54	52
2	69	69	64	60	52	54	52
3	69	69	64	60	51	54	52
4	66	69	64	62	52	54	52
5	66	69	63	62	52	54	54
6	66	66	64	63	52	52	56
7	69	66	64	62	52	52	56
8	69	66	64	61	52	52	56
9	69	66	67	59	59	52	56
10	69	66	66	60	64	54	56
11	69	66	66	59	59	54	59
12	69	66	66	58	56	52	59
13	69	66	66	58	56	52	59
14	69	66	68	57	56	54	59
15	72	66	70	56	54	54	59
16	72	66	67	56	54	54	59
17	75	64	65	55	56	54	59
18	81	62	64	54	59	54	59
19	88	62	64	54	56	52	59
20	84	62	64	54	56	52	59
21	84	62	63	55	56	54	59
22	84	62	63	57	56	54	59
23	78	62	64	59	56	54	56
24	78	64	64	56	56	54	59
25	75	62	64	55	56	54	59
26	75	62	65	54	56	54	62
27	75	62	64	54	54	52	62
28	75	62	63	54	54	52	62
29	72	62	63	52	56	52	62
30	72	62	62	50	54	52	62
31	69	.....	62	.....	54	52	.....

NOTE.—Discharge Oct. 1 to Dec. 3 not computed; gage not read Dec. 4 to Feb. 28.

Monthly discharge of Williamson River near Silver Lake, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March	88	66	73.1	4,490
April	69	62	64.8	3,860
May	70	62	64.5	3,970
June	63	50	57.2	3,400
July	64	51	55.1	3,390
August	54	52	53.2	3,270
September	62	52	57.8	3,440
The period	.....	.....	.....	25,800

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WILLIAMSON RIVER ABOVE SPRING CREEK, NEAR KLAMATH AGENCY, OREG.

LOCATION.—In sec. 2, T. 34 S., R. 7 E., 8 miles north of Chiloquin, about 2 miles above Spring Creek, and 6 miles northeast of Klamath Agency, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 9, 1917, to September 30, 1918; stations maintained at Rocky Ford in sec. 1, T. 33 S., R. 7 E., March 26, 1908, to June 30, 1910; and 5 miles above Spring Creek, May 1, 1912, to September 30, 1913. Inflow between Rocky Ford and present station about 20 second-feet, mostly from springs.

GAGE.—Stevens continuous water-stage recorder on left bank; inspected by Henry Shadley and R. C. Briggs.

DISCHARGE MEASUREMENTS.—Made from cable 25 feet below gage, or by wading at same section.

CHANNEL AND CONTROL.—One channel at all stages, straight with fairly smooth bottom and even current. Rocky riffle about 200 feet below gage practically permanent, except possibly as affected by growth of aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage, from water-stage recorder, 1.88 feet, at 12 m., March 29 and 10 a. m. March 30 (discharge, 475 second-feet); minimum stage recorded 0.09 foot July 31 (discharge, 30 second-feet).

Maximum discharge for 1917, determined in 1918 by leveling to high-water mark, was about 5.7 feet; discharge can not be computed.

ICE.—Some ice may form in extremely cold weather. No records during cold weather of 1918.

DIVERSIONS.—A large area of Klamath marsh and adjoining lands are irrigated by natural flooding, and smaller areas by ditches.

REGULATION.—None.

ACCURACY.—Stage discharge relation changed during a gap in record, between December and March. Rating curve for November and December fairly well defined; for March to August, well defined. Operation of recorder satisfactory except during July and August; float probably resting on floor of gage well during parts of these months. Daily discharge ascertained by applying to rating table the mean daily gage heights obtained by inspecting the recorder graph. Records good except those for July and August, which are fair.

Discharge measurements of Williamson River above Spring Creek, near Klamath Agency, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 14	0.55	84	June 5	0.34	58
Mar. 19	1.49	353	21	.18	42.4
Apr. 6	1.71	419	July 31	.09	29.4
23	1.05	228			

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Daily discharge, in second-feet, of Williamson River above Spring Creek, near Klamath Agency, Oreg., for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.
1	.....	162	.....	445	142	71	41	30
2	.....	178	.....	445	135	69	41	31
3	.....	190	.....	445	125	66	40	31
4	.....	190	.....	445	115	63	40	31
5	.....	190	.....	415	110	62	40	31
6	.....	205	.....	415	110	58	40	31
7	.....	205	.....	415	112	57	38	31
8	.....	205	.....	400	103	57	38	32
9	84	205	.....	385	106	56	38	32
10	86	205	.....	370	110	53	36	31
11	88	205	.....	370	108	53	36	32
12	88	205	.....	355	106	52	36	32
13	90	205	.....	340	101	49	35	32
14	92	190	.....	325	99	48	35	33
15	94	190	.....	325	101	47	34	33
16	94	190	.....	310	103	44	34	.....
17	94	190	.....	310	106	42	33	.....
18	94	190	.....	295	101	41	34	.....
19	99	190	355	295	97	41	34	.....
20	101	205	355	280	95	40	34	.....
21	101	220	370	250	97	40	34	.....
22	103	220	385	235	95	42	34	.....
23	106	235	400	222	90	42	34	.....
24	106	250	430	222	88	43	34	.....
25	106	265	445	200	88	43	34	.....
26	103	265	460	195	88	42	33	.....
27	103	.....	460	182	86	42	33	.....
28	106	.....	460	172	86	42	32	.....
29	115	.....	460	160	84	41	31	.....
30	128	.....	460	155	78	41	30	.....
31	.....	.....	460	.....	75	.....	30	.....

NOTE.—Mean discharge estimated as follows: Nov. 1-8, 80 second-feet; Dec. 27-31, 280 second-feet; Jan. 1-10, 270 second-feet; Jan. 11-31, 250 second-feet; Mar. 1-15, 280 second-feet; Mar. 16-18, 300 second-feet; Aug. 16-31, 40 second-feet.

Monthly discharge of Williamson River above Spring Creek, near Klamath Agency, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	[a] 70.0	4,300
November	128	.....	94.0	5,590
December	.....	162	218	13,400
January	.....	.....	[a] 256	15,700
February	.....	.....	[a] 270	15,000
March	460	.....	342	21,000
April	445	155	313	18,600
May	142	75	101	6,210
June	71	40	49.6	2,950
July	41	30	35.4	2,180
August	.....	30	35.9	1,990
September	.....	.....	[a] 60.0	3,570
The year	460	30	153	110,000

[a] Estimated.

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WILLIAMSON RIVER BELOW SPRAGUE RIVER, NEAR CHILOQUIN, OREG.

LOCATION.—In sec. 3, T. 35 S., R. 7 E., one-fourth mile below mouth of Sprague River and three-fourths mile southwest of Chiloquin, Klamath County.

DRAINAGE AREA.—2,810 square miles.

RECORDS AVAILABLE.—June 25, 1917, to September 30, 1918. The sum of discharge records at stations on Williamson and Sprague rivers above their junction is directly comparable with these records.

GAGE.—Friez water-stage recorder on left bank; inspected by F. H. Leslie.

DISCHARGE MEASUREMENTS.—Made at gage section from cable erected in November, 1917.

CHANNEL AND CONTROL.—Rocky ledge and boulders; probably permanent. Current somewhat uneven.

EXTREME OF DISCHARGE.—Maximum open-channel stage during year from water-stage recorder 2.38 feet at 12 m. March 28 (discharge, 2,000 second-feet); minimum stage from water-stage recorder, 0.84 feet July 14–17 (discharge, 582 second-feet; total, including canal, 616 second-feet).

1911–1917: Maximum discharge, obtained by adding results obtained at stations above junction, about 7,000 second-feet April 27, 1917; Williamson River estimated as 2,500 second-feet. Minimum combined discharge, 568 second-feet August 31 and September 1, 1915.

ICE.—Never any effect from ice here.

DIVERSIONS.—Modoc Point canal diverts water past station. Records furnished by United States Indian Service, at flume No. 1, below wasteway and about a mile below intake, have been used to compute total run-off past station. Large areas of land are irrigated from the river and its tributaries.

ACCURACY.—Stage-discharge relation practically permanent; rating curve well defined. Operation of recorder satisfactory October 20 to November 24, and after February 9; records for December somewhat uncertain. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records excellent, except October, December, and January, which are only fair on account of fragmentary or imperfect gage-height record, and May fair on account of log obstruction.

COOPERATION.—Station installed and part of field data furnished by United States Reclamation Service, J. B. Bond, project manager.

Discharge measurements of Williamson River below Sprague River near Chiloquin, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	R. C. Briggs	1.10	768	May 18	H. W. Humphrey	1.28	908
Mar. 20	do	1.49	1,250	June 6	do	1.00	760
Apr. 4	Humphrey [a] and Briggs.	1.90	1,490	20	R. C. Briggs	.92	636
24	R. C. Briggs	1.59	1,150	Aug. 1	do	.94	686

[a] Engineer employed by U. S. Reclamation Service.

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Daily discharge, in second-feet, of Williamson River below Sprague River near Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	790	960	.....	1,100	1,600	1,160	750	614	654	.....
2	.....	790	960	.....	1,100	1,550	1,120	750	606	646	.....
3	.....	830	1,000	.....	1,100	1,500	.....	750	598	630	.....
4	.....	830	1,050	.....	1,100	1,500	.....	750	590	630	.....
5	.....	830	1,000	.....	1,140	1,500	.....	710	590	630	.....
6	.....	830	960	.....	1,140	1,460	.....	710	590	630	.....
7	.....	830	960	.....	1,180	1,410	.....	710	590	622	670
8	.....	830	960	.....	1,140	1,360	.....	694	590	622	694
9	.....	830	1,000	1,180	1,140	1,320	.....	694	590	622	694
10	.....	830	960	1,230	.....	1,320	.....	686	590	622	686
11	.....	830	1,000	1,280	.....	1,320	960	686	590	622	694
12	.....	830	1,000	1,240	.....	1,360	960	686	598	622	702
13	.....	830	1,000	1,210	.....	1,410	960	678	590	622	710
14	.....	830	1,000	1,180	.....	1,460	950	670	582	630	702
15	.....	830	1,050	1,140	.....	1,460	940	662	582	630	694
16	.....	830	1,050	1,140	1,180	1,460	930	662	582	630	702
17	.....	830	1,050	1,100	1,180	1,460	915	654	582	630	702
18	.....	830	1,050	1,100	1,230	1,410	915	654	590	630	710
19	.....	830	1,100	1,100	1,230	1,360	915	646	590	630	702
20	790	830	1,100	1,050	1,320	1,320	915	646	590	630	694
21	790	830	1,100	1,050	1,410	1,280	915	646	590	630	694
22	790	830	1,140	1,050	1,460	1,280	870	646	598	630	710
23	790	790	1,140	1,050	1,460	1,230	870	654	614	630	686
24	790	790	1,180	1,100	1,550	1,230	830	654	606	630	686
25	.....	.....	1,180	1,050	1,650	1,230	830	646	606	630	686
26	.....	.....	1,180	1,100	1,750	1,280	830	638	614	630	686
27	.....	.....	1,180	1,100	1,800	1,280	790	638	622	630	694
28	.....	.....	1,230	1,100	1,850	1,280	790	638	630	630	694
29	.....	.....	1,230	.....	1,850	1,230	750	630	638	630	697
30	.....	.....	1,200	1,100	1,800	1,200	790	614	646	630	700
31	790	.....	1,200	.....	1,700	.....	750	.....	646	630	.....

NOTE.—Mean discharge estimated as follows: Oct. 1–19, 780 second-feet; Oct. 25–30, 790 second-feet; Nov. 25–30, 800 second-feet; Jan. 1–10, 1,120 second-feet; Jan. 11–31, 1,050 second-feet; Feb. 1–5, 1,050 second-feet; Feb. 6–8, 1,100 second-feet; Mar. 10–15, 1,160 second-feet; May 3–10, 1,040 second feet; Sept. 1–6, 650 second-feet. Daily discharge Apr. 30 to May 2 and May 11–16 obtained by adding the recorded discharge of Sprague River to the discharge of Williamson River above the Sprague, computed from a gage reading May 2, and comparison made in Apr. and May, when there was no obstruction.

Monthly discharge of Williamson River below Sprague River near Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	790	.....	784	48,200
November	830	790	819	48,700
December	1,230	960	1,070	65,800
January	.....	.....	1,070	65,800
February	1,280	1,050	1,110	61,600
March	1,850	1,100	1,340	82,400
April	1,600	1,200	1,370	81,500
May	1,160	750	935	57,500
June	750	614	675	40,200
July	646	582	601	37,000
August	654	622	629	38,700
September	710	.....	686	40,800
The year	1,850	582	923	668,000

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Combined monthly discharge of Williamson River and Modoc Point canal at flume No. 1, near Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May	1,170	766	947	58,200
June	774	617	692	41,200
July	670	612	629	38,700
August	670	635	650	40,000
September	720	.....	696	41,400
The year	1,850	612	930	674,000

NOTE.—See previous table for October to April.

UPPER KLAMATH LAKE NEAR KLAMATH FALLS, OREG.

LOCATION.—In sec. 30, T. 38 S., R. 9 E., at outlet of Upper Klamath Lake, about 2 miles northwest of Klamath Falls, Klamath County.

RECORDS AVAILABLE.—May 28 to October 22, 1904; January 7, 1906, to September 30, 1918.

GAGE.—Friez water-stage recorder since February 16, 1906; vertical staff prior to that date. Zero is 4,136.13 feet above sea level, 1918 readings have been reduced to a datum of 4,100 feet. During 1904 vertical staff on Pelican Bay; zero 4,135,997 feet above sea level.[1] Operation of water-stage recorder unsatisfactory a considerable part of the time. Inspected by employees of United States Reclamation Service.

EXTREMES OF STAGE.—Maximum stage during year from water-stage recorder, 42.13 feet at 10 p. m., April 12; minimum stage from water-stage recorder, 39.63 feet at 5 a. m., November 5, but the lake may have reached a lower stage during July when recorder was not operating.

1904 and 1906–1918: Maximum stage of Upper Klamath Lake for the period was 4,143.33 feet, April 23, 24, and 27, 1907. Minimum stage recorded 39.63 feet, September 2 and November 5, 1917.

FLUCTUATION.—Gage heights are very much affected by the wind. The water is lowered near the outlet when the wind blows from the south and is raised as much above its normal level when the wind is in the opposite direction. There is a periodic oscillation when the wind blows for any length of time.

COOPERATION.—Since May, 1909, this station has been maintained by the United States Reclamation Service.

[1] U. S. Geol. Survey Bull. 556, p. 86, 1914.

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Daily gage height, in feet, of Upper Klamath Lake near Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		40.53	40.53				41.45	41.03		39.93		
2		40.47			41.33	41.13	41.55	41.03				
3		40.38				41.18	41.40	41.03				
4		40.35				41.18	41.23	41.03				
5				41.13		41.23	41.17					
6	40.28					41.38	41.15			39.93	39.98	40.03
7					41.33	41.38	41.08		40.50			
8			40.63			41.30	40.90		40.43			
9						41.10	41.30		40.33	39.98		
10		40.48		41.23		41.10	41.23		40.38			
11						40 98	41.35	40.83	40.40			40.08
12						41.15	41.33	40.88	40.33			
13	40.48					41.18	41.33	40.85	40.35		40.08	
14	40.48					41.23	41.35	40.93	40.55			40.13
15	40.50		40.73			41.25	41.30	40.90	40.38			
16	40.78					41.10	41.30	40.85	40.13			
17	40.73	40.53					41.28	40.85		39.68		
18	40.50				41.20	41.13	41.30	40.85				40.13
19	40.40			41.23	41.30		41.20				40.03	
20	40.43				41.30		41.20					
21	40.43	40.58			41.33		41.18	40.73	40.23			40.03
22	40.45				41.35		41.15	40.73				
23					41.35	41.23	41.13	40.90				
24						41.08	41.15	40.73		39.93	40.08	
25		40.58				41.30	41.20	40.75				
26	40.75	40.60	40.89	41.28		41.35	41.10	40.95				
27	40.73	40.65			41.13	41.30	41.08	40.75				
28	40.70					41.38	41.10	40.73				
29	40.50		41.03			41 40	41.13	40.48				
30	40.40					41.33	41.13	40.43				40.28
31	40.50					41.35				39.98	40.08	

LINK RIVER AT KLAMATH FALLS, OREG.

LOCATION.—In NW. ¼ sec. 32, T. 38 S., R. 9 E., at county bridge over Link River at Klamath Falls, Klamath County, 1¼ miles below outlet of Upper Klamath Lake and immediately above head of Lake Ewauna.

DRAINAGE AREA.—3,110 square miles.

RECORDS AVAILABLE.—May 15, 1904, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank, about 500 yards above bridge in NW. ¼ sec. 32; elevation of zero is 4,080.0 feet above sea level. Friez recorder on opposite bank and a little farther upstream was used June 6, 1908, to August 30, 1912. Chain gage on the bridge used 1904 to 1908. Observers, Myrtle Ess and Marie Talbot.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Channel deep, current sluggish at low water. Rocks and boulders in rapids; mud and sand at bridge. The control for the gage is evidently permanent and water from the tailrace of the California-Oregon Power Co.'s plant, which enters the river opposite the gage, appears to affect it the same as if it came down the river channel. The stage-discharge relation at the chain gage is affected by backwater from Lake Ewauna, especially when the wind is blowing.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.90 feet at 3 p. m. April 1 (discharge, 3,350 second-feet); minimum stage during year, 4.07 feet at 3.30 p. m. July 18, determined by leveling (discharge estimated at 22 second-feet; river dry at outlet of Upper Klamath Lake).

1904–1918: Maximum stage, 7.30 feet at gage at bridge May 12, 1904, determined May 15, 1904, from high-water marks (discharge, 9,400 second-feet); minimum stage, that of 1918.

ICE.—Stage-discharge relation not affected by ice.

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DIVERSION.—The main or "A" canal of the Klamath project of the United States Reclamation Service diverts water from Link River immediately below the lower end of Upper Klamath Lake. Record is kept of this diversion. (See p. 278.) Some water is also diverted for irrigation from the tributaries to Upper Klamath Lake, but the total run-off is as yet only slightly affected.

REGULATION.—The only artificial regulation is caused by operation of power plant and is small. Marked natural fluctuations are caused by effect of wind on Upper Klamath Lake.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve fairly well defined. Operation of recorder satisfactory October 1 to December 19 and March 23 to September 30, except at extreme low stage, and fairly satisfactory for the balance of time except for days when discharge was interpolated or computed from gage heights for parts of days. Daily discharge ascertained by use of discharge integrator except as noted in footnote to table. Records good except those for days when discharge is less than 400 second-feet, which are poor.

COOPERATION.—Field data furnished by United States Reclamation Service, J. B. Bond, project manager.

Discharge measurements of Link River at Klamath Falls, Oreg., during the year ending Sept. 30, 1918.

[Made by H. W. Humphrey.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Dec. 15	5.71	1,570
July 18	[a] 4.07	[b] 22
19	4.68	557

[a] Determined by leveling.
[b] Including 10 second-feet in river and 12 second-feet in tailrace of power plant, practically all seepage and spring water; river dry at outlet of lake.

Daily discharge, in second-feet, of Link River at Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	980	1,030	1,230	1,910	2,360	2,000	3,030	2,020	1,310	430	160	640
2	950	970	1,130	2,030	2,180	2,140	3,110	1,890	1,190	450	360	800
3	950	900	1,170	1,870	2,220	.....	3,030	1,930	1,190	440	380	980
4	950	920	1,130	1,960	1,940	.....	2,810	2,060	1,170	440	[a] 420	900
5	930	970	1,190	1,890	2,010	.....	2,790	1,870	1,170	500	460	910
6	920	1,320	[a] 1,420	1,870	2,140	.....	2,580	1,830	1,180	500	400	840
7	970	1,130	[a] 1,640	1,940	2,280	.....	2,460	1,790	1,110	460	440	800
8	950	1,010	1,870	2,000	2,280	.....	2,140	1,790	1,110	400	420	[a] 780
9	970	1,030	1,810	[a] 2,040	2,280	2,210	2,170	1,450	970	380	470	760
10	970	980	1,860	[a] 2,100	2,320	2,290	2,280	1,590	990	490	450	800
11	970	940	1,850	[a] 2,140	2,350	2,290	[a] 2,450	1,420	1,000	500	530	810
12	980	1,100	1,850	2,180	2,370	2,370	[a] 2,630	1,420	940	440	580	710
13	960	1,210	1,770	.....	2,530	2,440	2,800	1,410	980	280	570	680
14	1,010	1,230	1,750	.....	2,500	2,430	2,680	1,480	1,100	250	340	790
15	1,050	1,170	1,600	.....	[a] 2,390	2,400	2,620	1,410	1,010	320	490	980
16	1,170	1,170	1,590	.....	2,280	2,360	2,620	1,400	790	350	500	980
17	1,020	1,130	1,620	.....	.....	2,000	2,570	1,440	990	440	660	970
18	990	1,110	1,760	.....	.....	2,110	2,550	1,460	1,010	320	[a] 640	930
19	1,000	1,110	1,750	2,430	.....	2,370	2,460	1,530	920	560	620	940
20	960	1,120	1,780	[a] 2,410	.....	2,400	2,430	1,560	920	630	570	940
21	930	1,150	1,810	[a] 2,400	.....	2,320	2,350	1,490	920	580	560	830
22	900	1,130	1,800	[a] 2,380	.....	2,310	2,390	1,470	880	600	600	1,000
23	980	1,130	1,810	2,360	.....	2,370	2,370	1,520	.....	600	550	930
24	1,070	1,130	1,880	2,360	.....	2,330	2,350	1,460	.....	490	480	940
25	1,000	1,130	1,850	[a] 2,430	2,000	2,400	2,280	1,430	.....	520	560	1,000
26	990	1,050	[a] 1,840	2,510	2,090	2,650	2,160	1,570	.....	600	580	1,040
27	1,120	1,010	[a] 1,820	2,520	2,070	2,650	2,010	1,480	.....	520	600	930
28	1,100	980	1,800	2,460	2,000	2,650	2,090	1,610	.....	470	670	780
29	1,030	1,080	1,940	2,600	.....	2,680	2,110	1,330	510	420	600	980
30	1,020	1,120	1,940	2,460	.....	2,670	2,090	1,390	440	300	590	910
31	1,030	.....	1,900	2,500	.....	2,850	.....	1,360	.....	320	500	.....

[a] Interpolated.

NOTE.—Mean discharge estimated as follows: Jan. 13-18, 2,300 second-feet; Feb. 17-24, 2,140 second-feet; Mar. 3-8, 2,180 second-feet; June 23-28, 700 second-feet.

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Monthly discharge of Link River at Klamath Falls, Oreg., for the year ending Sept. 30, 1918

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,170	920	1,000	61,500
November	1,320	900	1,080	64,300
December	1,940	1,130	1,680	103,000
January	2,600	1,870	2,240	138,000
February	2,530	1,940	2,200	122,000
March	2,850	2,000	2,350	144,000
April	3,110	2,090	2,480	148,000
May	2,060	1,330	1,580	97,200
June	1,310	440	933	55,500
July	630	250	452	27,800
August	670	160	511	31,400
September	1,040	640	872	51,900
The year	3,110	160	1,440	1,040,000

Daily discharge, in second-feet, of Link River and "A" canal at Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	2,130	1,510	749	433	783
2	.....	2,030	1,380	741	760	947
3	.....	2,090	1,410	669	791	1,100
4	.....	2,310	1,410	652	831	1,020
5	.....	2,170	1,410	712	860	1,010
6	.....	2,130	1,420	712	790	938
7	.....	2,100	1,410	680	830	897
8	.....	2,130	1,450	646	799	873
9	.....	1,870	1,340	626	828	845
10	.....	2,000	1,390	736	769	878
11	.....	1,810	1,420	746	821	888
12	.....	1,810	1,360	686	826	786
13	.....	1,790	1,410	509	834	747
14	.....	1,850	1,530	496	604	849
15	2,630	1,790	1,450	575	754	1,060
16	2,640	1,770	1,190	614	773	1,040
17	2,590	1,810	1,330	695	856	1,030
18	2,570	1,800	1,430	549	787	988
19	2,480	1,840	1,350	842	757	1,000
20	2,450	1,840	1,330	903	707	993
21	2,380	1,810	1,340	853	687	881
22	2,430	1,830	1,300	891	727	1,060
23	2,430	1,900	1,120	919	677	977
24	2,410	1,850	1,080	838	607	985
25	2,360	1,830	1,100	878	687	1,040
26	2,240	1,930	1,080	968	707	1,080
27	2,100	1,790	1,080	888	727	969
28	2,180	1,860	1,080	838	815	801
29	2,190	1,570	868	788	745	872
30	2,190	1,630	778	679	731	934
31	.....	1,570	.....	720	727	.....

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Monthly discharge of Link River and "A" canal at Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,170	920	1,000	61,500
November	1,320	900	1,080	64,300
December	1,940	1,130	1,680	103,000
January	2,600	1,870	2,240	138,000
February	2,530	1,940	2,200	122,000
March	2,850	2,000	2,350	144,000
April	3,110	2,100	2,510	149,000
May	2,310	1,570	1,890	116,000
June	1,510	778	1,290	76,800
July	968	496	735	45,200
August	860	433	750	46,100
September	1,100	747	942	56,000
The year	3,110	433	1,550	1,120,000

KLAMATH RIVER AT SPENCER BRIDGE, NEAR KENO, OREG.

LOCATION.—In sec. 32, T. 39 S., R. 7 E., at highway bridge 1 mile below Spencer Creek, 6 miles below former station at Keno, and 18 miles west of Klamath Falls, Klamath County, on road to Ashland.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 7, 1913, to September 30, 1918. Records at Keno, May 31, 1904, to December 31, 1913, give results smaller by the relatively small flow contributed by Spencer Creek.

GAGE.—Vertical staff near upstream end of first concrete pier at east end of bridge. Datum lowered 1.0 foot June 21, 1918. Gage reader, Esther Anderson.

DISCHARGE MEASUREMENTS.—Made from upstream side of wagon bridge or by wading at low water just above the bridge.

CHANNEL AND CONTROL.—Heavy gravel and boulders; practically permanent; bed very even.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.4 feet (new datum) April 2 and 4 (discharge, 3,070 second-feet); minimum stage recorded, 0.38 foot August 3 (discharge, 386 second-feet).

1904–1918: Maximum stage recorded at Keno, 15.3 feet about May 10, 1904, from high-water marks observed May 31 (discharge, 9,250 second-feet); minimum stage recorded that of 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Only a small quantity of water diverted below Klamath Falls station. At times water finds its way into Lower Klamath Lake through Klamath Straits; at other times the flow is into the river. Much of the winter flow of Lost River is diverted into Klamath River between Klamath Falls and Keno stations.

REGULATION.—Some natural regulation due to effect of wind on the wide flat stretches of river above Keno.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve revised below gage height 1.2 feet and is well defined. Gage read about three times a week to hundredths. Daily discharge ascertained by applying the daily gage reading to rating table. Results good except June, during which there is a gap in gage record, and July, during which the wind caused large diurnal fluctuations.

COOPERATION.—Field data furnished by United States Reclamation Service, J. B. Bond, project manager, Klamath project.

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Discharge measurements of Klamath River at Spencer Bridge, near Keno, Oreg., during the year ending Sept. 30, 1918.

[Made by H. W. Humphrey.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 21	0.87	768
July 19	.46	436

Daily discharge, in second-feet, of Klamath River at Spencer Bridge, near Keno, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		1,280	1,690	2,000					1,280		400	
2	1,090				2,350	2,530	3,070	2,000		720		
3		1,340		1,920				1,920			386	720
4	1,090		1,760				3,070	2,000	1,280			
5				2,000	2,170							720
6	1,090	1,480	1,920				2,890		1,220	720	470	
7					2,350	2,530		2,000				630
8		1,550	1,920	2,080					975		510	
9	1,090				2,440	2,350	2,710	1,690		550		
10		1,550									470	675
11	1,090		1,840				2,710	1,760		630		
12				2,170	2,440	2,350						720
13	1,150	1,550	1,840				2,620			675	590	
14					2,530	2,620		1,550				920
15		1,480	1,840	2,350							470	
16	1,280				2,530	2,530	2,710	1,550		435		
17		1,480		2,350							510	920
18	1,280		1,760				2,710	1,550		435		
19				2,440	2,530	2,530				435		920
20	1,280	1,480	1,840				2,440			550	590	
21					2,530	2,530		1,480	770			870
22		1,480	1,760	2,530					770	550	720	
23	1,220				2,350	2,530	2,620	1,480				
24		1,480		2,530							720	975
25	1,220		1,920				2,350	1,550	820	590		
26				2,530	2,530	2,530						1,090
27	1,280	1,480	1,920				2,080		820	630		
28					2,530	2,800		1,480				1,150
29		1,620	2,000	2,440					720		720	
30	1,280					2,890	2,080	1,280		470		
31				2,530							675	

Monthly discharge of Klamath River at Spencer Bridge, near Keno, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,280	1,090	1,190	73,200
November	1,620	1,280	1,480	88,100
December	2,000	1,690	1,850	114,000
January	2,530	1,920	2,300	141,000
February	2,530	2,170	2,440	136,000
March	2,890	2,350	2,560	157,000
April	3,070	2,080	2,620	156,000
May	2,000	1,280	1,640	101,000
June	1,280	720	962	57,200
July	720	435	580	35,700
August	720	386	556	34,200
September	1,150	630	859	51,100
The year	3,070	386	1,590	1,140,000

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KLAMATH RIVER NEAR SEIAD VALLEY, CALIF.

LOCATION.—In NE. ¼ sec. 13, T. 46 N., R. 12 W., above highway bridge, 300 feet above mouth of Walker Creek, 1¼ miles southeast of Seiad Valley, Siskiyou County, and 11½ miles below mouth of Scott River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 23, 1912, to September 30, 1918.

GAGE.—Staff in five sections fastened to trees on left bank one-fourth mile above highway bridge; read by M. J. Brickley.

DISCHARGE MEASUREMENTS.—Made from cable 35 feet below gage.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.3 feet April 4 (discharge, 6,170 second-feet); minimum stage recorded, 2.05 feet November 25 (discharge, from extension of rating curve, about 320 second-feet). (Controlled by dam above.)

1913–1918: Maximum stage recorded, 13.3 feet at 9.30 p. m., December 31, 1913 (discharge, from extension of rating curve, about 26,500 second-feet); minimum stage recorded, 2.05 feet November 25, 1917 (discharge, 320 second-feet).

DIVERSIONS.—Water is diverted from main river and tributaries above the station for use in irrigation, placer mining, and power developments.

REGULATION.—Effect of regulation believed to be small.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 1,000 and 4,000 second-feet, fairly well defined between 4,000 and 10,000 second-feet, and extended above 10,000 and below 1,000 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records excellent above 1,000 second-feet and fair below.

The following discharge measurement was made by J. F. Kunesh:

September 16, 1918: Gage height, 3.34 feet; discharge, 1,280 second-feet.

Daily discharge, in second-feet, of Klamath River near Seiad Valley, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,610	2,120	6,380	5,550	3,830	4,200	5,150	3,830	2,260	1,160	655	1,160
2	1,610	2,120	5,550	5,350	4,390	4,200	5,550	4,010	2,120	1,160	585	1,160
3	1,610	2,120	4,200	1,730	4,390	4,200	5,750	4,390	2,120	1,160	585	1,160
4	1,610	2,120	4,580	4,200	4,390	4,200	6,170	4,390	2,120	1,160	655	950
5	1,610	2,120	4,200	5,550	3,830	4,010	5,550	4,390	2,120	1,160	655	950
6	1,610	2,120	4,200	5,550	3,480	3,830	4,770	4,390	2,120	1,160	655	905
7	1,610	2,260	4,390	5,550	5,550	3,830	4,770	4,390	2,120	1,160	655	905
8	1,610	2,260	4,580	5,150	5,350	3,830	4,390	4,390	2,120	1,160	730	905
9	1,610	2,120	3,830	1,380	4,580	4,010	4,960	4,390	2,120	1,160	730	950
10	1,610	2,120	3,830	3,830	4,390	4,010	4,580	3,650	2,120	1,060	730	1,050
11	1,610	2,120	3,830	3,480	4,200	4,010	4,580	3,310	1,990	950	730	1,160
12	1,730	2,120	4,010	3,830	4,390	4,010	4,770	2,990	1,990	950	730	1,270
13	1,730	2,260	4,200	5,150	4,390	3,830	4,960	2,990	1,610	950	730	1,490
14	1,730	950	4,200	4,390	4,390	3,830	4,960	2,990	1,380	950	815	1,490
15	1,730	950	4,390	4,390	4,390	3,830	4,770	2,990	1,380	950	815	1,490
16	1,730	2,120	3,830	4,390	4,390	3,830	4,770	2,840	1,380	950	815	1,270
17	1,860	655	4,010	4,390	4,390	3,830	4,390	2,690	1,380	950	815	1,270
18	1,860	520	4,580	4,390	4,390	3,830	4,390	2,690	1,380	950	815	1,270
19	1,860	2,120	4,580	4,390	4,010	4,580	4,200	2,690	1,380	950	815	1,270
20	1,860	950	4,580	4,010	4,010	4,770	4,200	2,690	1,380	950	815	1,270
21	1,860	815	4,580	4,010	4,010	4,770	4,200	2,690	1,380	950	905	1,270
22	1,860	815	4,580	3,830	4,200	4,770	4,390	2,540	1,380	950	905	1,270
23	1,860	815	4,390	3,830	4,200	4,770	4,390	2,400	1,380	1,050	960	1,270
24	1,990	815	4,200	4,010	4,200	4,580	4,390	2,400	1,380	1,050	960	1,380
25	1,990	320	4,200	3,830	4,200	5,350	4,200	2,400	1,270	1,050	960	1,380
26	1,990	520	4,010	3,830	4,200	5,350	4,010	2,400	1,160	950	960	1,380
27	1,990	950	3,480	3,830	4,200	5,150	4,010	2,400	1,160	905	1,050	1,490
28	1,990	2,690	4,580	3,830	4,200	5,150	4,010	2,400	1,160	905	1,050	1,490
29	1,990	815	5,550	3,650	.....	5,150	4,010	2,260	1,160	905	1,160	1,490
30	1,990	4,200	5,350	3,650	.....	5,150	3,830	2,260	1,160	815	1,160	1,490
31	1,990	.....	1,490	3,480	.....	5,150	.....	2,260	.....	655	1,160	.....

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Monthly discharge of Klamath River near Seiad Valley, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,990	1,610	1,780	109,000
November	4,200	320	1,630	97,000
December	6,380	1,490	4,330	266,000
January	5,550	1,380	4,140	255,000
February	5,550	3,830	4,300	239,000
March	5,350	3,830	4,390	270,000
April	6,170	3,830	4,640	276,000
May	4,390	2,260	3,150	194,000
June	2,260	1,160	1,640	97,600
July	1,160	655	1,010	62,100
August	1,160	585	830	51,000
September	1,490	905	1,240	73,800
The year	6,380	320	2,750	1,990,000

KLAMATH RIVER NEAR REQUA, CALIF.

LOCATION.—In sec. 29, T. 13 N., R. 2 E., at Scofield Ferry, about 9 miles above Requa, Del Norte County and mouth of river and 30 miles below mouth of Trinity River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 25, 1910, to September 30, 1918.

GAGE.—Staff in four sections on right bank at ferry cable; read by S. A. McBeth and Charles McBeth.

DISCHARGE MEASUREMENTS.—Made from ferry cable.

CHANNEL AND CONTROL.—Gravel; fairly permanent. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.8 feet at 8.10 a. m. December 1 (discharge, 65,300 second-feet); minimum stage recorded, 4.85 feet August 11 and 12 (discharge, 1,490 second-feet).

1911–1918: Maximum stage recorded, 33.3 feet at 1 p. m. February 2, 1915 (discharge, from extension of rating curve, about 182,000 second-feet); minimum stage recorded, 4.85 feet August 11 and 12, 1918 (discharge, 1,490 second-feet).

DIVERSIONS.—Water is diverted for irrigation and power from main river and tributaries in Oregon and California.

REGULATION.—Effect of regulation is believed to be small.

ACCURACY.—Stage-discharge relation changed December 1. Rating curves fairly well defined between 1,500 second-feet and 3,000 second-feet, well defined between 3,000 and 60,000 second-feet; coincide at 6.6 feet and are extended above. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good, except estimated periods, which are fair.

The following discharge measurement was made by J. F. Kunesh:

September 4, 1918: Gage height, 5.03 feet; discharge, 1,640 second-feet.

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Daily discharge, in second-feet, of Klamath River near Requa, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,760	3,100	65,300	13,200	10,000	16,000	27,900	15,600	7,320	3,120	1,810	1,620
2	2,760	3,100	31,300	11,700	10,700	16,000	26,800	16,000	7,040	2,950	1,810	1,810
3	2,760	3,100	15,600	12,000	12,800	16,000	21,400	16,000	6,480	2,950	1,810	1,620
4	2,760	3,240	12,400	12,800	15,600	16,000	21,200	16,800	6,480	2,950	1,810	1,620
5	2,760	3,380	8,200	12,000	19,000	15,600	20,300	15,200	6,760	2,790	1,710	1,710
6	2,760	3,720	.....	11,400	23,000	15,600	19,400	14,000	7,040	2,630	1,620	1,810
7	2,760	4,500	.....	12,800	25,400	15,200	19,400	13,600	6,760	2,630	1,620	1,810
8	2,760	3,720	.....	12,800	33,700	15,200	19,400	12,800	6,760	2,630	1,620	1,810
9	2,760	3,720	.....	12,000	31,300	15,600	23,000	12,000	6,480	2,330	1,580	1,810
10	2,760	3,380	.....	12,000	24,800	15,600	31,300	11,400	6,200	2,330	1,580	1,830
11	2,760	5,420	.....	12,000	19,400	16,000	28,400	11,400	5,940	2,330	1,490	1,810
12	2,760	5,420	.....	21,200	19,000	17,600	24,800	11,000	5,680	2,330	1,490	1,810
13	2,760	5,420	.....	22,100	18,500	19,400	19,000	10,700	5,420	2,330	1,530	1,810
14	2,760	3,720	.....	23,000	19,400	18,500	19,400	10,400	5,180	2,330	1,580	1,930
15	2,660	2,860	.....	21,600	20,300	17,200	19,000	10,000	4,940	2,330	1,620	1,930
16	2,760	2,660	.....	19,000	22,100	18,500	18,500	9,400	4,500	2,330	1,710	2,100
17	2,860	2,660	.....	18,500	22,600	23,000	18,500	8,800	4,300	2,190	1,810	2,050
18	2,860	2,580	.....	18,500	23,000	26,800	18,500	8,800	4,100	2,050	1,810	2,630
19	2,860	2,510	.....	12,400	21,200	27,900	17,600	8,800	4,100	2,050	1,810	2,330
20	2,860	2,660	.....	12,400	18,500	30,700	18,000	8,500	4,100	2,050	1,810	2,330
21	2,860	2,860	.....	12,400	17,600	27,400	17,200	8,500	4,100	1,930	1,710	2,470
22	2,860	2,860	.....	10,700	16,000	25,800	16,800	8,500	3,900	1,810	1,710	2,330
23	2,860	2,580	.....	10,000	16,400	26,800	16,800	8,200	3,700	1,810	1,810	2,190
24	2,860	2,580	.....	10,400	17,200	27,900	17,200	8,200	3,700	2,050	1,810	2,330
25	2,860	2,400	.....	10,400	17,200	39,700	17,600	8,200	3,500	2,050	1,710	2,330
26	2,860	2,230	.....	10,700	18,500	37,300	17,600	7,900	3,300	2,050	1,620	2,330
27	2,860	2,160	.....	11,000	17,600	33,100	16,400	7,900	3,300	1,930	1,620	2,330
28	2,980	2,090	.....	11,400	16,400	28,400	16,000	7,600	3,300	1,930	1,530	2,470
29	2,980	9,400	.....	11,000	.....	26,400	15,200	7,600	3,300	1,930	1,530	2,330
30	2,980	34,900	23,000	10,700	.....	27,400	15,200	7,320	3,120	1,810	1,580	2,470
31	2,980	.....	14,400	10,700	.....	27,900	.....	7,040	.....	1,810	1,620	.....

NOTE.—Discharge estimated as follows: Dec. 6-10, 6,600 second feet; Dec. 11-25, 6,100 second feet; Dec. 26-29, 28,000 second feet.

Monthly discharge of Klamath River near Requa, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2,980	2,660	2,820	173,000
November	34,900	2,090	4,500	268,000
December	65,300	.....	13,100	812,000
January	23,000	10,000	13,600	836,000
February	33,700	10,000	19,500	1,080,000
March	39,700	15,200	22,600	1,390,000
April	31,300	15,200	20,000	1,190,000
May	16,800	7,040	10,600	652,000
June	7,320	3,120	5,030	299,000
July	3,120	1,810	2,280	140,000
August	1,810	1,490	1,670	103,000
September	2,630	1,620	2,060	123,000
The year	65,300	1,490	9,760	7,070,000

SCOTT CREEK NEAR FORT KLAMATH, OREG.

LOCATION.—In sec. 18, T. 31 S., R. 7 E., 4 miles west of Bend-Fort Klamath road and 25 miles by road from Fort Klamath, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 16 to September 30, 1917, and May 1 to August 7, 1918.

GAGE.—Vertical staff on right bank of creek; no observer, 1918.

DISCHARGE MEASUREMENTS.—Made by wading.

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CHANNEL AND CONTROL.—Stream bed of pumice. Banks covered with brush. No defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.02 feet July 15, 1917 (discharge, 31 second-feet); minimum stage recorded, 1.04 feet July 31, 1918 (discharge, 6.9 second-feet).

ICE.—No record during winter period.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—An estimate of the mean monthly flow believed to be fairly reliable has been made by comparison with record of flow of Sand Creek.

Discharge measurements of Scott Creek near Fort Klamath, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 18	1.08	7.0	June 22	1.26	11.0
May 7	1.26	11.2	July 31	1.04	6.9
June 6	1.23	10.6			

Monthly discharge of Scott Creek near Fort Klamath, Oreg., for the period, May 1 to Aug. 7, 1918.

Month.	Discharge in second-feet. (mean).	Run-off in acre-feet.
May	11.3	694
June	10.9	651
July	8.19	503
Aug. 1-7	6.86	95
The period	.....	1,940

NOTE.—Estimate based on comparison of 9 simultaneous measurements of each stream, which indicated flow of Scott Creek to be 39 per cent of Sand Creek.

SAND CREEK NEAR FORT KLAMATH, OREG.

LOCATION.—In sec. 29, T. 31 S., R. 7 E., 3½ miles above bridge on Bend-Fort Klamath road and 25 miles by road from Fort Klamath, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 15 to September 30, 1917, and May 1 to August 7, 1918.

GAGE.—Stevens 8-day recorder on north bank of creek, opposite vertical staff used in 1917.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Stream bed of shifting pumice. No defined control. Banks low but well defined at gage; about 100 yards below gage the stream, spreads and some water disappears in the pumice soil.

EXTREMES OF DISCHARGE.—Maximum stage during period May 1 to August 7 from water stage recorder 0.76 feet, May 10 and 19, June 12 and 13 (discharge, 32 second-feet; minimum stage from recorder 0.48 foot August 7 (discharge, 16 second-feet).

ICE.—Stream freezes in winter; no record.

DIVERSIONS.—None.

REGULATION.—None

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ACCURACY.—Stage-discharge relation practically permanent during season; rating curve well defined. Operation of recorder satisfactory during May and June and first week of August; no record during July. Daily discharge ascertained by applying to rating table the mean gage heights obtained by inspecting the recorder graph. Records good.

Discharge measurements of Sand Creek near Fort Klamath, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec-ft.*
Oct. 18	R. C. Briggs	0.73	20.7	June 22	R. C. Briggs	.69	27.8
May 1	F. F. Henshaw	.69	25.8	July 31	do	.53	18.4
June 6	R. C. Briggs	.71	28.2				

Daily discharge, in second-feet, of Sand Creek near Fort Klamath, Oreg., for the period, May 1 to Aug. 7, 1918.

Day.	May.	June.	Aug.	Day.	May.	June.	Aug.	Day.	May.	June.	Aug.
1	28	a 27	18	11	30	30	.....	21	a 30	a 27	.....
2	30	a 28	18	12	29	30	.....	22	28	27	.....
3	30	a 28	18	13	29	32	.....	23	28	27	.....
4	30	a 28	18	14	30	a 32	.....	24	28	26	.....
5	30	a 29	17	15	30	a 31	.....	25	28	26	.....
6	30	29	17	16	30	a 31	.....	26	28	26	.....
7	30	29	17	17	29	a 30	.....	27	27	25	.....
8	30	29	.....	18	30	a 29	.....	28	26	24	.....
9	31	30	.....	19	29	a 28	.....	29	26	24	.....
10	30	30	.....	20	31	a 28	.....	30	a 26	24	.....
								31	a 27	.....	.....

a Interpolated.

Monthly discharge of Sand Creek near Fort Klamath, Oreg., for the period, May 1 to Aug. 7, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May	31	26	29.0	1,780
June	32	24	28.1	1,670
July	.....	.....	a 21.0	1,290
August 1-7	18	17	17.6	244
The period	.....	.....	.....	4,980

a Estimated.

NORTH FORK OF SPRAGUE RIVER NEAR BLY, OREG.

LOCATION.—In sec. 35, T. 35 S., R. 14½ E., at Dennis ranch, 10 miles north of Bly, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 18 to September 30, 1917, and March 27 to July 31, 1918, when station was discontinued.

GAGE.—Vertical staff on right bank, one-fourth mile above a diversion dam and 1¼ miles above ranch buildings. New gage installed April 11, 1918, 200 feet above old gage.

DISCHARGE MEASUREMENTS.—Made by wading.

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CHANNEL AND CONTROL.—Stream bed of coarse gravel; practically permanent at new gage; part of old beaver dam affected stage-discharge relation at old gage at times.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 3.60 feet on old gage April 9 (discharge, 208 second-feet); minimum stage recorded, 0.18 feet July 6–11 (discharge, 14 second-feet), minimum, including Sprague River Irrigation Co. canal, 35 second-feet July 16.

ICE.—Stream freezes; no winter records.

DIVERSIONS.—Sprague River Irrigation Co. canal diverts water around gage (see p. 266). Several small ditches divert from the upper tributaries.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed April 11, owing to relocation of gage; poorly-defined rating curve used for old gage, March 27 to April 10; well defined curve used April 11 to July 31. Gage read practically every day to hundredths. Daily discharge ascertained by applying daily gage reading to rating table. Records good.

Discharge measurements of North Fork of Sprague River near Bly, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 27	2.49	73	May 22	0.44	66
Apr. 11	[a] 3.42	182	June 18	.02	25.6
18	.89	143	Aug. 4	.12	34.9
May 4	1.02	148			

[a] Gage reading 1.30 feet on new gage.

Daily discharge, in second-feet, of North Fork of Sprague River near Bly, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	June.	July.	Day.	Mar.	Apr.	May.	June.	July.
1		105	145	45	18	16		130	108	28	20
2		112	145	43	18	17		138	94	27	20
3		94	145	41	17	18		130	87	26	20
4		83	145	41	15	19		141	80	24	22
5		83	145	41	15	20		152	72	24	23
6		105	145	39	14	21		167	69	24	23
7		110	130	39	14	22		182	67	24	23
8		116	130	39	14	23		190	62	24	31
9		208	130	35	14	24		190	60	23	32
10		179	130	31	14	25		179	64	23	32
11		190	108	31	14	26		168	63	18	32
12		198	108	32	16	27	73	160	60	18	32
13		175	115	32	19	28	78	145	58	18	36
14		160	115	31	19	29	83	145	53	17	34
15		130	122	29	20	30	83	152	49	18	32
						31	94		47		32

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Monthly discharge of North Fork of Sprague River near Bly, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March 27-31	94	73	82.2	815
April	208	83	147	8,750
May	145	47	98.4	6,050
June	45	17	29.5	1,760
July	36	14	22.1	1,360
The period				18,700

Combined monthly discharge of North Fork of Sprague River and Sprague River Irrigation Co.'s canal near Bly, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March 27-31	94	73	82.2	815
April	208	83	149	8,870
May	162	72	121	7,440
June	70	45	55.6	3,310
July	44	35	39.1	2,400
The year				22,800

SPRAGUE RIVER NEAR BEATTY,[1] OREG.

LOCATION.—In NW. ¼ sec. 20, T. 36 S., R. 13 E., 2 miles above highway bridge on road from Yainax to Silver Lake, 4 miles above mouth of Sycan River, 3 miles east of Beatty post office, and 10 miles east of Yainax, Klamath County.

DRAINAGE AREA.—513 square miles.

RECORDS AVAILABLE.—April 19, 1912, to September 30, 1918, with some breaks due to lack of observer.

GAGE.—Vertical staff gage with inclined lower section on left bank. Stevens water-stage recorder at same location used February 20, 1914, to September 11, 1917. Gage reader, Earl Hamaker.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; no defined control as stream is very sluggish for miles above and below gage; banks subject to overflow at a stage of about 5 feet and considerable water may flow in a cut-off across a bend to the right of the station.

DISCHARGE MEASUREMENTS.—Made from cable about 100 feet below gage; at high stages from wagon bridge 2 miles downstream and inflow estimated.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.04 feet March 29 (discharge, 460 second-feet). Minimum stage recorded 0.50 foot June 29 (discharge, 84 second-feet), but the flow may have gone slightly lower in July.

1912–1918: Maximum stage from water-stage recorder 5.75 feet April 24, 1917 (discharge, 1,320 second-feet); minimum stage that of 1918. There was recorded at a station 2 miles downstream on May 21, 1904, a discharge of 2,080 second-feet.

ICE.—Stage-discharge relation seldom affected by ice as stream is spring fed.

DIVERSIONS.—Considerable water is diverted near Bly for irrigation.

REGULATION.—None.

[1] Referred to in previous reports as near Yainax, Oreg.

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ACCURACY.—Stage-discharge relation fairly permanent except during summer when it was affected by growth of aquatic plants. Well-defined rating curve used October 1 to May 3; fairly well-defined curve, to allow for effect of aquatic-plant growth, May 20 to June 29. Gage read once a day to hundredths October 1 to March 30 and May 26 to June 29. No observer at other times. Records good except for April and May; records for these months poor on account of fragmentary gage-height record.

Discharge measurements of Sprague River near Beatty, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 22	0.96	140	May 22	1.56	190
Mar. 23	2.30	326	June 17	.69	99
26	3.00	447	Aug. 4	.75	111
Apr. 20	2.43	347			

Daily discharge, in second-feet, of Sprague River near Beatty, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	139	142	213	174	169	165	.....	a 340	138
2	139	140	213	169	169	167	.....	a 320	136
3	139	142	213	162	165	191	.....	308	134
4	139	142	206	162	162	245	.....	.....	132
5	139	148	203	165	155	254	.....	.....	128
6	139	144	189	157	160	308	.....	.....	126
7	139	146	189	157	165	325	.....	.....	124
8	139	144	186	155	174	325	.....	.....	122
9	136	142	177	162	179	325	.....	.....	118
10	138	144	172	162	179	334	414	.....	114
11	139	140	167	167	179	334	423	.....	108
12	134	144	142	169	177	334	.....	.....	110
13	134	142	144	169	177	342	.....	.....	110
14	134	142	146	169	172	342	.....	.....	108
15	134	140	148	167	167	334	.....	.....	106
16	134	140	151	165	169	342	.....	.....	103
17	134	142	153	162	167	342	.....	.....	100
18	134	138	160	162	162	342	.....	.....	98
19	134	136	167	157	153	342	.....	.....	98
20	134	136	167	155	153	351	351	204	97
21	142	134	155	153	153	360	.....	a 198	98
22	139	134	155	153	155	369	.....	191	97
23	142	136	155	153	157	351	.....	a 175	95
24	142	142	162	151	160	378	.....	159	94
25	140	142	172	157	160	423	.....	a 159	94
26	140	167	179	155	162	441	.....	158	92
27	140	186	201	165	165	432	.....	172	90
28	140	198	213	165	165	450	.....	158	87
29	138	203	216	167	.....	460	.....	153	84
30	140	211	184	172	.....	450	.....	145	a 84
31	142	.....	179	174	.....	a 450	.....	138	.....

a Interpolated or estimated.

NOTE.—Mean discharge estimated as follows: Apr. 1-9, 420 second-feet; Apr. 12-19, 425 second-feet; Apr. 21-30, 405 second-feet; May 4-19, 250 second-feet.

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Monthly discharge of Sprague River near Beatty, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	142	134	138	8,480
November	211	134	150	8,920
December	216	142	177	10,900
January	174	151	162	9,960
February	179	153	165	9,160
March	460	165	342	21,000
April	.....	.....	414	24,600
May	.....	138	225	13,800
June	138	84	108	6,430
The period	.....	.....	.....	113,000

SPRAGUE RIVER AT CHILOQUIN, OREG.

LOCATION.—In NE. ¼ sec. 3, T. 35 S., R. 7 E., half a mile above mouth and same distance above Southern Pacific Railroad bridge (where station was located up to Oct. 31, 1914), half a mile below diversion dam of Modoc Point canal of United States Indian Service, and three-fourths mile south of Chiloquin, Klamath County.

DRAINAGE AREA.—1,550 square miles.

RECORDS AVAILABLE.—July 25, 1911, to September 30, 1918; partly fragmentary.

GAGE.—Friez water-stage recorder on right bank 500 feet above wagon bridge, installed June 25, 1917. Vertical staff on wagon bridge was read November 1, 1914, to June 25, 1917, and a chain gage on railroad bridge up to October 31, 1914. Gage inspected by F. H. Leslie.

DISCHARGE MEASUREMENTS.—Made from upstream side of wagon bridge.

CHANNEL AND CONTROL.—Bed composed of rocks and boulders; heavy control, may shift slightly; obstructed by logs, April 29 to May 10, 1918.

EXTREMES OF DISCHARGE.—Maximum open-channel stage recorded during year, from water-stage recorder, 2.27 feet March 28 (discharge, 1,250 second-feet); minimum stage from water-stage recorder, 0.92 foot July 15 and 16 (discharge, 208 second-feet; including Modoc Point canal, 248 second-feet).

1911–1918: Maximum stage recorded 5.3 feet, March 28, 1917 (discharge, 4,490 second-feet); mimimum discharge that of 1918.

ICE.—Stage-discharge relation affected by ice only during short periods of extremely cold weather.

DIVERSIONS.—The Modoc Point canal, completed in 1915, diverted some water around the gage, of which a record was kept (see p. 275). A considerable quantity of water is also diverted for irrigation in the headwaters of Sprague and Sycan rivers.

REGULATION.—Manipulation of sluiceway of diversion dam may cause some fluctuation at the gage.

ACCURACY.—Stage-discharge relation practically permanent, except during period of log obstruction April 29 to May 10. Rating curve well defined. Operation of recorder satisfactory except December 1 to January 12, and for short periods during which discharge is estimated. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records good except those for October, December, and January, which are fair.

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Discharge measurements of Sprague River at Chiloquin, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	R. C. Briggs	1.20	358	May 18	W. W. Humphrey [a]	1.44	514
Mar. 18	do	1.47	503	June 6	do	1.14	303
Apr. 4	do	1.72	705	21	R. C. Briggs	1.00	241
23	do	1.60	620	Aug. 1	do	1.01	241
May 2	do	2.58	657				

[a] Engineer employed by United States Reclamation Service.

Daily discharge, in second-feet, of Sprague River at Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.
1	.....	350	422	491	.....	428	800	682	386	245	245	232
2	.....	356	440	484	.....	428	755	657	368	240	245	232
3	.....	358	477	484	.....	434	755	.....	362	232	240	236
4	.....	360	505	484	.....	446	755	.....	350	232	236	240
5	.....	362	470	484	.....	464	710	.....	332	232	236	240
6	.....	362	422	476	422	498	665	.....	314	232	236	240
7	.....	368	410	467	452	505	620	.....	314	232	236	240
8	.....	374	422	459	446	491	620	.....	308	232	232	.....
9	.....	374	428	450	470	458	620	.....	308	236	228	.....
10	.....	380	422	442	528	470	580	.....	302	228	232	.....
11	.....	380	446	434	580	484	620	519	296	222	232	.....
12	.....	380	434	422	540	491	665	519	290	217	236	.....
13	.....	380	434	.....	519	519	710	519	285	212	240	.....
14	.....	380	440	.....	491	526	800	519	280	212	245	220
15	.....	380	440	.....	484	533	850	512	275	208	250	222
16	.....	380	440	.....	452	519	850	498	268	208	250	224
17	.....	380	446	.....	440	505	850	491	261	212	255	228
18	.....	.....	452	.....	434	512	800	498	254	216	255	236
19	.....	.....	452	.....	422	540	710	491	247	216	255	236
20	344	.....	458	.....	392	620	665	484	240	216	260	236
21	344	.....	464	.....	398	665	665	477	240	216	265	240
22	344	.....	470	.....	398	755	620	458	245	224	265	245
23	344	.....	477	.....	386	755	620	440	270	232	265	232
24	344	380	484	.....	392	800	665	422	265	236	260	232
25	350	380	484	.....	404	900	665	416	265	236	.....	236
26	350	380	484	.....	422	1,000	710	410	265	236	.....	236
27	350	374	491	.....	422	1,050	755	392	265	240	.....	236
28	350	374	505	.....	422	1,150	755	386	265	240	.....	236
29	350	380	512	.....	.....	1,100	730	380	260	240	.....	240
30	350	401	505	.....	.....	1,050	706	392	245	240	.....	250
31	350	.....	498	.....	.....	900	.....	392	.....	245	.....	.....

NOTE.—Mean discharge estimated as follows: Oct. 1-19, 340 second-feet; Nov. 18-23, 380 second-feet; Jan. 13 to Feb. 5, 420 second-feet; May 3-10, 588 second-feet; Aug. 25-31, 250 second-feet; Sept. 8-13, 230 second-feet.

Combined daily discharge, in second-feet, of Sprague River and Modoc Point canal near Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	688	407	254	285	253	16	509	291	248	274	245
2	663	392	253	285	253	17	502	284	252	295	249
3	.....	386	254	280	257	18	501	277	256	295	257
4	.....	371	254	276	261	19	504	270	256	295	257
5	.....	355	254	276	261	20	497	263	256	300	257
6	.....	336	254	276	261	21	490	263	256	305	261
7	.....	336	254	276	261	22	471	263	264	305	266
8	.....	330	253	272	251	23	453	273	272	305	253
9	.....	330	259	268	251	24	435	268	276	300	253
10	.....	324	272	272	251	25	429	265	276	290	257
11	530	319	261	272	251	26	426	265	276	290	257
12	530	313	256	262	251	27	408	268	280	290	257
13	530	308	252	264	251	28	402	268	280	285	257
14	530	303	252	269	241	29	396	263	280	285	261
15	523	298	248	274	243	30	409	248	280	285	271
						31	411	.....	285	285	.....

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Monthly discharge of Sprague River at Chiloquin, Oreg., for the year ending September 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	350	.....	343	21,100
November	401	350	375	22,300
December	512	410	459	28,200
January	491	.....	437	26,900
February	580	.....	443	24,600
March	1,150	428	645	39,700
April	850	530	710	42,200
May	682	380	505	31,100
June	386	240	288	17,100
July	245	208	228	14,000
August	265	228	247	15,200
September	250	220	234	13,900
The year	1,150	208	409	296,000

Combined monthly discharge of Sprague River and Modoc Point River canal at Chiloquin, Oreg., for the year ending September 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	353	.....	346	21,300
November	401	353	376	22,400
December	512	410	459	28,200
January	491	.....	437	26,900
February	580	.....	443	24,600
March	1,160	428	649	39,900
April	855	585	715	42,500
May	688	396	517	31,800
June	407	248	305	18,100
July	285	248	262	16,100
August	305	262	284	17,500
September	271	241	255	15,200
The year	1,160	241	421	304,000

SPRAGUE RIVER IRRIGATION CO.'S CANAL NEAR BLY, OREG.

LOCATION.—In T. 35 S., R. 14 E. probably in sec. 36, 2½ miles below head gate and just below a wasteway, 8 miles north of Bly, Klamath County.

RECORDS AVAILABLE.—April 27 to July 31, 1918.

GAGE.—Vertical staff; read by J. M. McFerren.

CHANNEL AND CONTROL.—Canal section about 16 feet wide on bottom; rock bottom overlain with gravel; practically permanent.

DISCHARGE MEASUREMENTS.—Made from foot bridge about 200 feet above gage or by wading.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.30 feet on June 10, 11, 28, July 5, 8, and 12 (discharge, 28 second-feet). Canal dry up to April 27.

ACCURACY.—Stage-discharge relation permanent; rating curve well defined. Gage read daily or every other day to half-tenths. Daily discharge ascertained by applying daily gage reading to rating table. Records good except those for May which are practically estimates.

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Discharge measurements of Sprague River Irrigation Co.'s canal near Bly, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 4	1.60	18.0	June 18	2.10	25.1
24	2.10	23.7	Aug. 4	.75	4.4

Daily discharge, in second-feet, of Sprague River Irrigation Co. canal near Bly, Oreg., for the period, Apr. 27 to July 31, 1918.

Day.	May.	June.	July.	Day.	May.	June.	July.	Day.	May.	June.	July.
1	.....	35	26	11	.....	28	28	21	.....	26	15
2	.....	24	26	12	.....	26	28	22	.....	27	15
3	.....	26	26	13	.....	26	20	23	.....	26	5
4	.....	26	26	14	.....	26	18	24	.....	24	.....
5	.....	26	28	15	.....	26	17	25	.....	26	.....
6	.....	24	27	16	.....	25	15	26	.....	27	.....
7	.....	25	27	17	.....	25	16	27	.....	28	.....
8	.....	26	28	18	.....	25	17	28	.....	28	.....
9	.....	27	27	19	.....	25	16	29	.....	28	.....
10	.....	28	28	20	.....	26	16	30	23	27	.....
								31	26	.....	.....

NOTE.—Mean discharge estimated as follows: Apr. 27–30, 15 second-feet; May 1–10, 17 second-feet; May 11–29; July 19–23, as in table; July 24–31, 4 second-feet.

Monthly discharge of Sprague River Irrigation Co. canal near Bly, Oreg., for the period, Apr. 27 to July 31, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April (4 days)	.....	.....	15.0	119
May	.....	.....	22.4	1,380
June	28	24	26.1	1,550
July	28	.....	17.0	1,050
The period	.....	.....	.....	4,100

FIVEMILE CREEK NEAR BLY, OREG.

LOCATION.—In sec. 1, T. 36 S., R. 13 E., 1 mile above mouth and about 8 miles northwest of Bly, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 8, 1917, to September 30, 1918.

GAGE.—Stevens 8-day recorder on left bank; vertical staff used after May 5. Former gage about one-fourth mile above mouth, established April 17, 1917, but no gage readings are available. Gage inspected by F. C. Lange.

DISCHARGE MEASUREMENTS.—Made by wading near gage; high-water measurements can be made from a pole bridge near old gage.

CHANNEL CONTROL.—Channel crooked and lined with thick growth of willows. An artificial control, consisting of a log with sheet piling driven on the upstream side was installed September 14, 1917, but was unsuccessful due to washing around its ends.

EXTREME OF DISCHARGE.—Maximum stage from water-stage recorder for period September 8, 1917, to September 30, 1918, 1.33 feet March 26 (discharge, 40 second-feet). Minimum stage recorded during period was 0.90 foot May 18 (discharge, 19 second-feet).

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ICE.—Stream freezes over in cold weather. discharge remains practically steady as it is all from springs.

DIVERSION.—None above gage, two ditches divert between gage and mouth of stream.

REGULATION.—None.

ACCURACY.—Stage discharge relation unstable. Rating curves used as follows: September 18, 1917, to January 20, 1918, poorly defined; March 23 to April 30, fairly well defined; May 4 to July 20 fairly well defined; other periods by interpolation. Recorder operated in a satisfactory manner September 11 to October 7. October 21 to November 25, with gaps, and March 23 to May 4, occasional staff gage readings to hundredths at other times. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph or the staff gage reading. Records good, even when fragmentary, on account of the steady character of the stream.

Discharge measurements of Fivemile Creek near Bly, Oreg., during the years ending Sept. 30, 1917 and 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1917.	*Feet.*	*Sec.-ft.*	1918.	*Feet.*	*Sec.-ft.*	1918.	*Feet.*	*Sec.-ft.*
Apr. 17	1.53	37.2	Mar. 28	1.22	36.1	May 4	.94	20.1
18	1.38	33.2	Apr. 1	1.18	33.8	24	.94	20.3
June 30	[a] 1.90	22.4	10	1.08	28.4	June 18	.96	20.4
Sept. 8	[a] 1.80	20.9	15	.98	23.2	Aug. 4	.90	19.5
11	[b] .65	23.2	25	.89	21.1			
Oct. 22	1.04	20.8						

[a] Stage-discharge relation affected by backwater from diversion dam.
[b] On new gage; old gage read 1.90, affected by backwater.

Daily discharge, in second-feet, of Fivemile Creek near Ely, Oreg., for the period Sept. 8, 1917, to Aug. 4, 1918.

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.
1		22	22				33	21	21		
2		22	22				29	21			
3		21	22	23			27	21			
4		22	22				27	20			20
5		23	23				27	21			
6		22	22				26	21		20	
7		22	22				25	21			
8	21		22				26	20			
9	22		22				29	20	20		
10	22		22				29	20			
11	23		22				27	20			
12	23				23		25	20			
13	23						25	20		21	
14	22			23			25	20			
15	22						25	19	21		
16	22						23	19			
17	21						23	19			
18	20		23				23	19	21		
19	21		23				22	19			
20	21		23		24		22	19		21	
21	21	22	23				22	19			
22	21	22	23				21	20	21		
23	22	22	23			25	21	20			
24	22	22	23			20	21	21			
25	21	22	23			38	21	21			
26	21	22				40	21	21			
27	21	22				33	21	21			
28	22	22				33	21	21			
29	21	22				36	21	21	20		
30	21	22				34	21	21			
31		23				34		21			

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Monthly discharge of Fivemile Creek near Bly, Oreg., for the period Sept. 8, 1917, to Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
Sept, 1917	23	20	21.4	1,270
1917-18.				
October	23	21	22.0	1,350
November	23	22	22.5	1,340
December			25.0	1,540
January			23.5	1,440
February			23.0	1,280
March	40		26.1	1,600
April	33	21	24.3	1,450
May	21	19	20.2	1,240
June			20.5	1,220
July			20.7	1,270
August			[a] 20.0	1,230
September			[a] 20.0	1,190
The year			22.3	16,200

[a] Estimated.

SYCAN RIVER NEAR SILVER LAKE, OREG.

LOCATION.—In sec. 21, T. 32 S., R. 14 E., about one-fourth mile above the upper diversion dam for Sycan Marsh, one mile above ZX ranch house and 30 miles south of Silver Lake, Lake County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 16, 1905, to May 31, 1906; May 10 to September 30, 1918.

GAGE.—Stevens 8-day recorder on right bank, installed May 15, 1918. Temporary gage installed May 10, 1918 was found to be affected by backwater. Inspected by James Burke.

DISCHARGE MEASUREMENTS.—Made by wading near gage at low and medium stages, from wagon bridge near ranch house at high water.

CHANNEL AND CONTROL.—Gravel bed somewhat shifting, banks of rock and soil, with scattered willows; may overflow right bank at extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage during spring observed from high-water marks, about 3.5 feet (discharge estimated from extension of rating curve, at 400 second-feet). Minimum stage recorded, 0.44 feet September 1-3 and 27-30 (discharge 2.9 second-feet.)

ICE.—Stream probably freezes nearly solid in winter.

DIVERSION.—None above station; most of the water is applied to Sycan Marsh by flooding, from several dams and ditches.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent at permanent station beginning May 15. Rating curve well defined. Operation of recorder satisfactory except during August and September, when well may have been silted up. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph, except May 10 to 14, when shifting-control method was used. Records good.

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Discharge measurements of Sycan River near Silver Lake, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 10	.....	105	June 7	1.04	27.3
15	1.79	88	July 28	.53	5.1

Daily discharge, in second-feet, of Sycan River near Silver Lake, Oreg., for the period, May 10 to Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	33	9.8	4.8	2.9	16	86	18	6.2	5.0	11
2	.....	33	9.4	4.8	2.9	17	74	18	5.9	5.0	7.8
3	.....	32	9.0	4.8	2.9	18	64	17	5.6	5.3	6.7
4	.....	31	9.0	4.8	3.1	19	58	16	5.3	5.3	5.9
5	.....	30	8.2	4.8	3.3	20	55	15	5.3	5.0	5.3
6	.....	29	7.0	4.8	3.5	21	52	15	5.6	4.8	4.5
7	.....	27	7.0	4.8	3.5	22	49	15	5.6	4.5	3.8
8	.....	26	7.0	4.8	3.8	23	46	15	5.3	4.2	3.8
9	.....	24	7.0	4.8	3.8	24	43	14	5.3	4.0	3.3
10	105	22	7.0	4.8	3.8	25	43	13	5.3	3.8	3.1
11	100	22	7.0	4.8	4.0	26	45	13	5.3	3.8	3.1
12	90	21	6.7	4.8	4.0	27	56	11	5.0	3.8	2.9
13	85	23	6.4	4.8	3.8	29	48	11	5.0	3.8	2.9
14	80	20	6.4	4.8	3.8	30	42	10	5.0	3.5	2.9
15	88	19	6.4	5.0	11	30	38	10	5.0	3.3	2.9
						31	35	.....	5.0	3.1	.....

Monthly discharge of Sycan River near Silver Lake, Oreg., for the period, May 10 to Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 10-31	105	35	62.8	2,740
June	33	10	20.1	1,200
July	9.8	5.0	6.42	395
August	5.3	3.1	4.53	279
September	11	2.9	4.33	258
The period	.....	.....	.....	4,870

SYCAN RIVER NEAR BEATTY, OREG.

LOCATION.—In SE. ¼ sec. 8, T. 35 S., R. 12 E., 8 miles by stream above mouth, 11 miles by road north of Beatty, and 18 miles northeast of Yainax, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 29, 1917, to September 30, 1918; November 25, 1911, to October 29, 1917, at station referred to as Sycan River near Yainax.

GAGE.—Stevens water-stage recorder on left bank; inspected by J. L. Richards and A. S. Hotchkin. Vertical staff in sec. 3, T. 36 S., R. 12 E., about 6 miles below present gage, was used 1911 to 1913, and recorder in NW. ¼ sec. 28, about 3 miles below present gage, up to October 29, 1917.

DISCHARGE MEASUREMENTS.—Made from cable 200 feet upstream from gage or by wading.

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CHANNEL AND CONTROL.—Stream bed, gravel and small boulders, fairly even; control of small boulders about 100 feet below gage, fairly permanent. One straight channel at all stages; banks not subject to overflow at gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.97 feet at 4 a. m. April 25 (discharge, 760 second-feet); minimum stage from water-stage recorder, 0.20 foot July 22 to 30 (discharge, 10 second-feet).

1911–1918: Maximum stage at station in sec. 28, 11.25 feet, April 25, 1917 (discharge 2,250 second-feet); minimum, that of 1918.

ICE.—Stage-discharge relation apparently unaffected by ice, as most of low-water flow comes from springs.

DIVERSIONS.—Some water is used for irrigation by flooding on Sycan Marsh.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined; operation of recorder fairly satisfactory, except for a few gaps, when discharge has been estimated; paper did not run quite true. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records good.

Discharge measurements of Sycan River near Beatty, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 29	0.42	19.3	Mar. 29	1.30	168	May 21	0.85	62
Mar. 23	1.90	343	Apr. 13	1.51	219	June 17	.45	23.1
25	2.28	476	May 4	1.05	97	Aug. 3	.26	12.1

Daily discharge, in second-feet, of Sycan River near Beatty, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	25	24	49	45	.....	26	135	.....	42	17	16	11
2	24	25	46	42	.....	26	132	.....	41	17	15	11
3	24	25	27	38	.....	27	106	.....	39	16	13	12
4	24	26	49	35	.....	30	83	100	37	16	15	12
5	22	27	43	33	.....	28	86	.....	36	16	15	12
6	22	30	32	34	.....	24	83	.....	34	15	14	13
7	22	32	33	37	.....	31	79	.....	32	15	15	14
8	21	34	25	34	.....	31	74	.....	31	15	15	16
9	21	33	25	25	72	24	76	.....	29	14	14	19
10	21	32	25	19	56	26	100	.....	28	14	14	18
11	21	32	24	33	54	28	135	.....	27	14	15	18
12	.....	33	26	31	46	27	185	.....	26	14	14	18
13	.....	.....	25	25	29	26	215	.....	26	14	14	18
14	.....		27	32	24	25	215	.....	25	14	12	19
15	.....	.....	34	30	28	29	178	.....	25	14	13	18
16	.....	.....	36	27	23	32	155	.....	24	14	13	18
17	.....	.....	42	29	20	37	135	86	22	14	12	18
18	.....	26	44	39	19	43	118	80	20	14	11	16
19	.....	25	43	28	18	64	110	75	20	14	11	16
20	.....	25	40	.....	18	83	110	70	19	14	10	16
21	.....	26	36	.....	17	172	128	64	19	14	10	16
22	.....	26	43	.....	19	362	165	62	19	14	10	16
23	23	26	40	.....	22	600	200	56	19	14	10	16
24	23	25	42	.....	19	640	230	51	18	15	10	16
25	23	26	44	.....	19	468	230	50	18	16	10	14
26	23	24	44	.....	19	398	215	51	17	16	10	14
27	22	.....	42	.....	22	275	.....	50	18	15	10	13
28	22	.....	43	.....	22	200	.....	49	17	15	10	14
29	20	.....	44	.....	.....	160	.....	49	17	14	10	19
30	22	.....	44	.....	.....	135	.....	48	18	14	10	18
31	23	.....	48	.....	.....	130	.....	43	.....	14	10	.....

NOTE.—Discharge estimated as follows: Oct. 12–22, 22 second-feet; Nov. 13–17, 30 second-feet; Nov. 27–30, 26 second-feet; Jan. 20 to Feb. 5, 30 second-feet; Feb. 5–8, 50 second-feet; April 27 to May 3, 145 second-feet; May 5–16, 93 second-feet.

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Monthly discharge of Sycan River near Beatty, Oreg., for the year ending Sept. 30, 1918

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	25	20	22.3	1,37[illegible]
November	.....	24	29.2	1,74[illegible]
December	49	24	37.6	2,31[illegible]
January	45	19	31.5	1,94[illegible]
February	72	17	30.9	1,72[illegible]
March	640	24	136	8,36[illegible]
April	230	74	142	8,45[illegible]
May	.....	43	81.8	5,03[illegible]
June	42	17	25.4	1,51[illegible]
July	17	14	14.7	90[illegible]
August	16	10	12.3	75[illegible]
September	19	11	15.6	92[illegible]
The year	640	10	48.3	35,000

LONG CREEK NEAR SILVER LAKE, OREG.

LOCATION.—In sec. 4, T. 32 S., R. 13 E., 27 miles south of Silver Lake, Lake County, above point where creek begins to divide and spread over marsh.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 13 to September 30, 1918.

GAGE.—Stevens continuous recorder on left bank of creek.

DISCHARGE MEASUREMENTS.—Made by wading below gage.

CHANNEL AND CONTROL.—Stream bed crooked and deep. Vertical sod banks with scattered growth of willows. No defined control, beaver dams may occasionally cause backwater.

EXTREMES OF DISCHARGE.—Maximum stage during 1918, observed from high-water marks May 13, was about 2.0 feet (discharge about 62 second-feet). Minimum stage from recorder 0.48 foot, July 28–31, August 9–11, and September 28 (discharge, 9 second-feet).

ICE.—Stream freezes; no record during winter.

DIVERSIONS.—None above station; water is spread over meadows below station by numerous dams.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined. Operation of recorder satisfactory May 13–31 and June 8–26, and July 28–August 11, fairly satisfactory during part of September. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records good as discharge is probably quite steady during gaps in record.

Discharge measurements of Long Creek near Silver Lake, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 13	1.39	35.4
June 8	1.10	23.7
July 28	.48	9.0

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Daily discharge, in second-feet, of Long Creek near Silver Lake, Oreg., for the period May 13 to Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1				9.3	10	16	35	16			168
2				9.3	9.8	17	32	16			
3				9.0	10	18	30	15			
4				9.2	10	19	30	14			
5				9.3	10	20	30	14			
6				9.3	11	21	29	14			
7				9.2	12	22	29	14		9.3	
8		24		9.0	19	23	30	15		9.5	
9		22		9.0	18	24	30	13		9.5	
10		22		9.0	15	25	29	13		9.6	
11		20		9.0	14	26	29	13		10	
12		19			13	27	27			10	
13	35	19			14	28	25		9.0		9.0
14	39	18				29	24		9.0		9.5
15	39	17				30	25		9.0		11
						31	25		9.0		

NOTE.—Discharge estimated June 1-7, 24 second-feet; June 27-30, 12 second-feet; July 1-27, 11 second-feet; Aug. 12-21, 9 second-feet; Aug. 28-31, 10 second-feet; Sept. 14-27, 12 second-feet.

Monthly discharge of Long Creek near Silver Lake, Oreg., for the period May 13 to Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 13-31	39	25	30.1	1,130
June			17.8	1,060
July		9.0	10.7	658
August	10	9.0	9.31	572
September	19	9.0	12.1	720
The period				4,140

WHISKEY CREEK NEAR BEATTY, OREG.

LOCATION.—In sec. 19, T. 36 S., R. 12 E., at wagon bridge on road between Yainax and Beatty, 4 miles east of Yainax, Klamath County, and 2 miles above mouth of stream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 27 to June 5, 1917, and March 23 to September 30, 1918; occasional gage readings during interval.

GAGE.—Vertical staff on main channel; Stevens 8-day recorder installed temporarily, used March 26 to May 5. Gage reader, A. S. Hotchkin.

DISCHARGE MEASUREMENTS.—Made from bridges.

CHANNEL AND CONTROL.—Stream bed of mud; brush along banks; fall in stream very slight; no defined control. Four channels at highest stages; one at low water. Conditions unfavorable. Stage-discharge relation affected by growth of aquatic plants during summer.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.0 feet at 10 a. m., March 23 and 26 (discharge, 45 second-feet); minimum discharge recorded, 10 second-feet, June 19 to July 1 (gage height 1.13 to 1.18 second-feet, affected by growth of aquatic plants).

ICE.—Stage-discharge relation affected by backwater from ice during winter, but not during period covered by records.

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DIVERSIONS.—Some bottom land above station irrigated by flooding.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent to middle of May; affected by growth of aquatic plants thereafter. Well-defined rating curve used March 23 to May 11; shifting control method used thereafter. Operation of recorder satisfactory; gage read about once a week to hundredths after May 5, when recorder was removed. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph, or the daily gage reading. Records good.

Discharge measurements of Whiskey Creek near Beatty, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 30	1.22	13.4	Apr. 12	1.33	18.2	June 19	1.13	9.6
Mar. 23	2.00	44.8	19	1.28	15.6	Aug. 3	1.33	12.1
30	1.63	26.0	May 5	1.05	12.7			
Apr. 2	1.43	16.9	21	1.15	12.5			

Daily discharge, in second-feet, of Whiskey Creek near Beatty, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		20	14	11	10		
2		18	13	11			
3		17	13			12	
4		17	12			12	
5		17	12		11		
6		17			11	12	
7		17				12	
8		17		11			12
9		21					
10		20		11		12	12
11		18	11			12	
12		17					
13		17			11		
14		17					12
15		16		11	11		
16		16		11			
17		16				12	
18		15	12			12	
19		15		10			
20		15			12		
21		14	12				12
22		14		10			
23	45	12				12	12
24	42	13				12	
25	44	12	12				
26	45	13		10			
27	36	13	12		12		
28	29	13					12
29	27	14		10			
30	25	14					
31	23					12	

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Monthly discharge of Whiskey Creek near Beatty, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March 23-31	45	23	35.1	627
April	21	12	15.8	940
May	14	11	12.3	756
June	11	10	10.6	631
July	12	10	11.1	682
August	12	12	12.0	738
September	12	12	12.0	714
The period				5,090

MODOC POINT CANAL NEAR CHILOQUIN, OREG.

LOCATION.—In SE. ¼ sec. 3, T. 35 S., R. 7 E., at intake 1 mile south of Chiloquin, Klamath County.

RECORDS AVAILABLE.—June 14, 1915, to September 30, 1918.

GAGE.—Inclined staff on left of concrete-lined section, about 100 feet below head gates; installed June 29, 1915; previous to that date readings were made on gage at bridge, one-half mile below. Gage reader, F. H. Leslie.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section of canal begins immediately below gage; bottom width, 10 feet; grade, 2.64 feet per mile. Control is cobblestone apron several hundred feet below gage, placed in March, 1918.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.62 feet July 10 (discharge, 52 second-feet). Canal dry at times. 95 second-feet was diverted July 10, 1915, but most of it turned back into river at first wasteway.

ACCURACY.—Stage-discharge relation practically permanent during season. Rating curve well defined. Gage read to quarter-tenths once a day. Daily discharge ascertained by applying gage readings to rating table. Records good for May to August; roughly approximate for rest of season.

Discharge measurements of Modoc Point canal near Chiloquin, Oreg., during the year ending Sept. 30, 1918.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 5	0.65	3.2	June 5	1.98	23.5
Apr. 23	1.00	5.0	Aug. 1	2.40	39.7
May 6	1.43	11.7			

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Daily discharge, in second-feet, of Modoc Point canal near Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Day.	Apr.	May.	June.	July.	Aug.
1	.....	6	21	9	40	16	.....	11	23	40	24
2	.....	6	24	13	40	17	.....	11	23	40	40
3	.....	10	24	22	40	18	.....	13	23	40	40
4	.....	10	21	22	40	19	.....	13	23	40	40
5	.....	10	23	22	40	20	.....	13	23	40	40
6	.....	11	22	22	40	21	.....	13	23	40	40
7	.....	11	22	22	40	22	.....	13	18	40	40
8	.....	11	22	21	40	23	5	13	3	40	40
9	.....	11	22	23	40	24	6	13	3	40	40
10	.....	11	22	44	40	25	6	13	.....	40	40
11	.....	11	23	39	40	26	5	16	.....	40	40
12	.....	11	23	39	26	27	5	16	3	40	40
13	.....	11	23	40	24	28	5	16	3	40	.....
14	.....	11	23	40	24	29	5	16	3	40	.....
15	.....	11	23	40	24	30	4	17	3	40	.....
						31	.....	19	.....	40	.....

NOTE.—Mean discharge estimated as follows: Oct. 1 to Nov. 10, 3 second-feet; Mar. 8 to Apr. 22, 5 second-feet; Aug. 28–31, 35 second-feet. Canal dry Nov. 6 to Mar. 7.

Monthly discharge of Modoc Point canal near Chiloquin, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	a 3.0	184
November 1–10	.....	.....	a 3.0	60
March (24 days)	.....	.....	a 5.0	238
April	.....	.....	5.0	298
May	19	6	12.2	750
June (28 days)	24	3	18.3	1,020
July	44	9	34.1	2,100
August	40	24	36.8	2,260
September	.....	.....	a 21.0	1,250
The period	.....	.....	.....	8,160

a Estimated.

WOOD RIVER AT FORT KLAMATH, OREG.

LOCATION.—In sec. 22, T. 33 S., R. 7½ E., at highway bridge one-fourth mile east of Fort Klamath, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 5, 1911, to September 30, 1918.

GAGE.—Vertical staff attached to bridge; read daily by Mrs. E. A. Page

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Clean gravel overlain with pumice sand, dunes of which may at times be observed moving downstream; likely to shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.5 feet February 6 (discharge can not be computed on account of backwater from logs); minimum stage recorded, 0.90 foot September 12 (discharge, 170 second-feet).

1911 and 1913–1918: Maximum open-water stage recorded, 2.50 feet July 24, 1913 (discharge, 495 second-feet, somewhat uncertain). The lowest discharge is that of 1918.

ICE.—Stage-discharge relation unaffected by ice, as most of the water comes from copious springs a few miles above.

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DIVERSIONS.—Considerable water is diverted above station for watering hay lands, mostly in May and June.

REGULATION.—None.

ACCURACY.—Stage-discharge relation unstable on account of log jams. Fairly well-defined rating curve used April 1–23 and July 23 to September 30; daily discharge ascertained by method shifting of control October 1–23, April 24 to July 22; discharge October 24 to March 31 not computed. Gage read once daily to half-tenths; readings appear reliable. Records for October and April to September, good.

COOPERATION.—Gage-height records and part of discharge measurements furnished by United States Reclamation Service.

Discharge measurements of Wood River at Fort Klamath, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	R. C. Briggs	1.35	244	May 22	H. W. Humphrey	1.06	208
Apr. 4	Briggs and Humphrey	1.35	278	28	R. C. Briggs	1.00	206
19	H. W. Humphrey	1.40	293	June 22	do	1.00	212
May 4	do	1.18	257	Aug. 8	do	1.00	184

Daily discharge, in second-feet, of Wood River at Fort Klamath, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May	June.	July.	Aug.	Sept.
1	214	292	268	207	202	202	191
2	224	292	265	207	202	202	191
3	224	292	252	207	191	214	191
4	224	287	257	207	191	202	191
5	234	292	252	207	191	202	191
6	244	292	238	207	191	202	180
7	244	292	238	207	191	191	180
8	234	292	238	207	191	191	191
9	234	292	238	207	191	191	202
10	224	292	238	207	191	180	191
11	224	292	226	207	191	180	180
12	224	296	226	219	191	180	170
13	224	292	226	243	191	180	191
14	224	292	226	257	191	180	202
15	224	278	226	257	180	180	202
16	234	278	226	243	176	191	202
17	234	278	226	231	176	191	214
18	234	278	214	207	176	191	214
19	244	287	214	207	176	191	226
20	234	278	202	207	176	214	226
21	234	278	202	207	176	214	214
22	234	278	205	207	187	226	214
23	234	265	214	207	191	226	226
24	.....	265	214	207	191	226	226
25	.....	252	214	207	191	214	226
26	.....	252	214	202	191	214	226
27	.....	252	214	202	191	214	238
28	.....	265	207	191	191	214	238
29	.....	265	207	191	191	202	214
30	.....	265	207	191	191	191	214
31	.....	.....	207	.....	202	191	.....

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Monthly discharge of Wood River at Fort Klamath, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-23	244	214	231	10,500
April	292	252	280	16,700
May	265	207	226	13,900
June	257	191	212	12,600
July	202	176	189	11,600
August	226	180	199	12,200
September	238	170	205	12,200

"A" CANAL AT KLAMATH FALLS, OREG.

LOCATION.—In NW. ¼ sec. 29, T. 38 S., R. 9 E., at head of tunnel one-fourth mile below head gates of canal and 1 mile northwest of Klamath Falls, Klamath County.

RECORDS AVAILABLE.—Irrigation season, 1911 to 1918. Some water was diverted for three or four years prior to 1911, but no record was kept.

GAGE.—Stevens 8-day water-stage recorder on right of canal just above weir. Barrett & Lawrence recorder used prior to 1917.

DISCHARGE MEASUREMENTS.—Made from a foot plank just inside lower end of tunnel, about half a mile below gage; rectangular section, 13.5 feet wide.

CHANNEL AND CONTROL.—Trapezoidal weir, 18.15 feet long, with its crest 7.27 feet above bottom of canal, which is a concrete-lined section 13.5 feet wide on the bottom, 12 feet deep, and with side slopes ½ to 1. Canal has become partly filled with débris which has fallen in from the sides.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.54 feet at 8 p. m. June 15 (discharge, 479 second-feet).

1911-1918: Maximum stage that of 1918. Minimum discharge, zero.

ACCURACY.—Stage discharge relation unstable. Discharge for given gage height increasing from year to year as velocity of approach becomes greater, due to filling up of canal above weir. Rating curve for 1918 based upon rating curve for 1916, and discharge measurements made after September 30, 1918. Operation of water-stage recorder satisfactory except September 19-24. Records considered good.

COOPERATION.—Data furnished by United States Reclamation Service.

"A" canal diverts water from Link River immediately below outlet of Upper Klamath Lake in NE. ¼ sec. 30, T. 38 S., R. 9 E., for irrigating lands east of Klamath River on both sides of Lost River. Most of the return waters reach Lost River.

Daily discharge, in second-feet, of "A" canal at Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug	Sept.
1	.....	106	204	319	273	143	16	18	368	400	264	273	53
2	.....	143	188	291	400	147	17	21	368	338	255	196	58
3	.....	162	220	229	411	137	18	21	338	422	229	147	58
4	.....	246	238	212	411	119	19	21	310	433	282	137	55
5	.....	300	238	212	400	102	20	21	282	411	273	137	53
6	.....	300	238	212	390	98	21	26	319	422	273	127	51
7	.....	310	300	220	390	97	22	44	358	422	291	127	49
8	.....	338	338	246	379	93	23	56	379	422	319	127	47
9	.....	422	368	246	358	85	24	63	390	379	348	127	45
10	.....	411	400	246	319	78	25	75	400	400	358	127	43
11	.....	390	422	246	291	78	26	81	358	379	368	127	39
12	.....	390	422	246	246	76	27	89	310	379	368	127	39
13	.....	379	433	229	264	67	28	88	255	379	368	145	21
14	.....	368	433	246	264	59	29	79	238	358	368	145	12
15	8	379	444	255	264	58	30	96	238	338	379	141	24
							31	.....	212	.....	400	137	.....

NOTE.—Canal dry Oct 1 to Apr. 14. Daily discharge interpolated Sept. 19-24.

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Monthly discharge of "A" canal at Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
April 15-30	96	8	50.4	1,600
May	422	106	315	19,400
June	444	188	359	21,400
July	400	212	284	17,500
August	411	127	239	14,700
September	147	12	69.6	4,140
The year				78,700

LOST RIVER AT WILSON BRIDGE, NEAR OLENE, OREG.

LOCATION.—On line between secs. 29 and 30, T. 39 S., R. 10 E., at Wilson Bridge, one-fourth mile below diversions dam and 4 miles by river below Olene, Klamath County.

RECORDS AVAILABLE.—March 14, 1912, to September 30, 1918.

DRAINAGE AREA.—Not measured.

GAGE.—Gurley 7-day recorder, referred to vertical staff fastened to highway bridge. Zero of gage, 4,005.01 feet above sea level or 0.17 foot lower than previous datum. Gage read by watchman for dam.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Gravel and chalk rock; clean and fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year 65.20 feet at 7 p. m. March 21 (discharge, 696 second-feet); minimum discharge estimated as 6 second-feet (leakage through flashboards) October 1 to March 18 and April 4 to September 30.

1904–1918: Maximum stage recorded, 18.25 feet, mean for February 7, 1907, at Merrill station (discharge, 9,200 second-feet). The maximum stage for Olene station was 13.5 feet early in 1904, determined from high-water marks by John H. Lewis, May 24, 1904 (discharge, from partly developed rating curve, 8,600 second-feet). Minimum stage recorded for natural flow conditions, 4.29 feet June 19, 1911, at Olene (discharge, 58 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—This station is just below the dam at which practically all the discharge of Lost River up to about 500 second-feet is diverted through the diversion canal into Klamath River or into the G canal on the east bank of the river.

REGULATION.—Considerable pondage at dam.

ACCURACY.—Stage-discharge relation practically permanent during run-off period; rating curve well defined. Operation of recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records good.

COOPERATION.—Field data furnished by United States Reclamation Service, J. B. Bond, project manager.

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Discharge measurements of Lost River at Wilson Bridge near Olene, Oreg., during the year ending Sept. 30, 1918.

[Made by H. W. Humphrey.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 23	63.94	470	Mar. 29	63.12	376	Apr. 2	61.10	149
25	64.46	567	30	62.05	258	3	60.62	113
27	65.01	658	Apr. 2	61.62	197			

Daily discharge, in second-feet, of Lost River at Wilson Bridge near Olene, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	Day.	Mar.	Apr.	Day.	Mar.	Apr.
1		232	11			21	652	
2		149	12			22	609	
3		88	13			23	496	
4			14			24	511	
5			15			25	567	
6			16			26	519	
7			17			27	634	
8			18	0		28	511	
9			19	40		29	384	
10			20	364		30	296	
						31	278	

NOTE.—Discharge estimated 6 second-feet; Oct. 1 to Mar. 18; Apr. 4 to Sept. 30.

Combined daily discharge, in second-feet, of Lost River, Lost River diversion canal, and G canal, less Olene wasteway, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.
1	96	91	102	134	158	142	535	95	86	110	108	100
2	95	87	106	132	153	142	446	98	97	119	85	99
3	94	83	108	137	147	147	383	113	109	122	81	92
4	94	83	107	135	139	155	300	88	110	121	87	90
5	94	84	106	135	139	175	294	93	93	122	95	90
6	91	84	104	134	141	204	284	88	78	119	102	92
7	93	85	105	134	147	214	274	101	71	113	111	90
8	91	85	105	134	153	221	266	97	55	87	110	89
9	93	85	106	134	188	216	268	95	80	56	106	
10	94	87	109	138	220	218	261	78	78	59	102	
11	94	90	112	135	216	218	259	65	65	73	101	
12	94	92	112	139	208	224	255	89	77	53	99	
13	94	92	112		212	232	255	109	84	42	81	
14	94	90	112		212	224	245	108	83	51	58	
15	94	89	119		210	220	234	86	99	30	62	
16	89	89	121		180	212	219	62	97	29	77	
17	88	89	124		157	202	206	58	96	27	72	
18	90	92	123		151	208	192	44	106	53	73	
19	92	92	122	161	142	279	180	52	123	53	72	
20	93	92	122	207	137	625	171	64	130	56	74	
21		92	122	284	132	933	175	57	131	66	74	
22		92	122	290	134	890	171	42	121	78	70	
23		92	122	261	133	777	86	47	115	79	76	
24		92	122	237	139	800	54	63	117	82	76	
25		93	123	222	138	861	62	83	116	101	80	
26		93	124	208	141	811	70	77	103	104	94	
27		92	126	193	141	933	74	74	93	108	95	
28	90	93	127	184	145	808	78	96	26	109	101	
29	93	94	127	180		673	81	91	75	116	100	
30	93	96	127	173		585	84	92	138	116	101	
31	95		129	168		572		96		112	100	

NOTE.—Discharge for last part of September discarded; there was probably some flow through the diversion canal of which no record was kept. Discharge estimated: Oct. 21–27, 92 second-feet; Jan. 13–18, 150 second-feet.

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Monthly discharge of Lost River at Wilson Bridge, near Olene, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October			a 6.0	369
November			a 6.0	357
December			a 6.0	369
January			a 6.0	369
February			a 6.0	333
March	652	6	193	11,900
April	232	6	21.0	1,250
May			a 6.0	369
June			a 6.0	357
July			a 6.0	369
August			a 6.0	369
September			a 6.0	357
The year	652		23.1	16,800

a Estimated.

Combined monthly discharge of Lost River, Lost River diversion canal, and G canal, less Olene wasteway, near Olene, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	96	88	92.6	5,690
November	96	83	89.7	5,340
December	129	102	116	7,130
January	290	132	171	10,500
February	220	132	161	8,940
March	933	142	423	26,000
April	535	54	216	12,900
May	113	42	80.7	4,960
June	138	26	95.1	5,660
July	122	27	82.8	5,090
August	111	58	87.8	5,400
September	100		a 85.0	5,060
The year	933	26	142	103,000

a Estimated.

TULE LAKE NEAR MERRILL, OREG.

LOCATION.—At Bloody Point, on east shore of lake, in SW. ¼ sec. 36, T. 48 N., R. 5 E., Calif.; formerly in sec. 8, T. 41 S., R. 11 E., at boat landing on J. F. Adams's ranch, half a mile south of ranch building and 3 miles east of Merrill, Klamath County.

RECORDS AVAILABLE.—May 17, 1904, to September 30, 1918.

GAGE.—Vertical staff at end of D canal of Klamath project, 7 miles below Malin, Oreg., used beginning June 27. Former gage was vertical staff on pile driven in bed of Lost River at a point which was formerly close to its mouth but is now nearly 2 miles from the open lake. Datum of new gage 4041.83 feet above sea level; of gage used September 22, 1916, to June 11, 1918, 4,043.93 feet above sea level; all readings reduced to a datum 4,000 feet above sea level. Several earlier gages used prior to 1916; readings beginning October 1, 1912, refer to sea-level datum; earlier readings subject to some uncertainty of datum. Gage readers, employees of United States Reclamation Service.

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EXTREMES OF STAGE.—Maximum stage recorded during year 4,045.0 feet October 10; Minimum stage recorded, 4,042.38 feet, September 27, 1918.

1904–1918: Maximum stage recorded, 11.35 feet April 30 and May 1, 1907, or 4,059.91 feet above sea level. Minimum stage recorded is that of 1918.

DIVERSIONS AND REGULATIONS.—No water has reached mouth of Lost River from drainage area above Clear Lake dam since June, 1909; since May 1, 1912, most of the discharge of Lost River up to 400 or 500 feet second-feet has been diverted at Lost River dam into Klamath River or through the G canal for irrigation.

COOPERATION.—Records furnished by United States Reclamation Service, Klamath project, J. B. Bond, project manager.

Daily gage height, in feet, of Tule Lake near Merrill, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		44.80						44.60	44.30			
2					44.84	44.75						
3								44.57				
4												
5				40.81					44.32			
6											43.03	
7			44.80									42.58
8							44.80					
9										43.65		
10								44.55				
11	45.00							44.52	44.26			
12							44.75					
13												
14												
15						44.75	44.73			43.48		
16								44.44				
17												
18		44.80					44.75					42.48
19												
20	44.28					44.85	44.75					
21			44.80									
22				44.84			44.70			43.31	42.73	
23								44.34				
24		44.76			44.84							
25												
26												
27	44.76								43.78			42.38
28			44.88	44.82	44.75							
29								44.36			42.63	
30												
31										43.28		

MILLER CREEK NEAR LORELLA, OREG.

LOCATION.—In sec. 7, T. 40 S., R. 14 E., at site of old wagon bridge three-fourths mile above highway bridge, 1 mile east of Swingle ranch in Langell Valley, and 3 miles south of Lorella, Klamath County.

DRAINAGE AREA.—270 square miles.

RECORDS AVAILABLE.—April 1, 1909, to September 30, 1918; August 10, 1904, to December, 1908, for a station in sec. 12, T. 39 S., R. 13 E., at the lower end of Horsefly Valley and 10 miles or more by creek above the present station. Only a small amount of inflow between the two points.

GAGE.—Friez water-stage recorder on right bank installed January 3, 1918, replacing temporary installation used since April 25, 1917, when old installation on bridge abutment on left bank was washed out. Gage inspected by H. E. Winnard, jr.

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DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading at low water; current is sluggish at the bridge, as the gradient of the stream is flat.

CHANNEL AND CONTROL.—Stream bed composed of rocks and gravel, overlain with some silt; control fairly permanent; left bank subject to overflow in floods.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.20 feet at 4 a. m. March 26 (discharge, 1,490 second-feet); minimum stage not recorded; stream practically dry.

1904–1918: Maximum stage recorded, 14.0 feet February 5, 1907 (discharge, 6,730 second-feet).

ICE.—Stage-discharge relation apparently not materially affected by ice, as control remains open.

DIVERSIONS.—A small irrigating flume, carrying about 1 second-foot, diverts water above the station.

REGULATION.—Flow may be occasionally affected by a rock-and-brush diversion dam just above gage.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve changed slightly below 17 second-feet to conform to 1918 measurement and is well defined. Operation of water-stage recorder fairly satisfactory except January 5–12, when float well was frozen and January 13–15, 20–21, April 1–5 and 15–19, when no record was secured. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records fair.

COOPERATION.—Field data furnished by United States Reclamation Service, Klamath project.

The following measurement was made by H. W. Humphrey:

April 24: Gage height, 3.06 feet, discharge, 3.9 second-feet.

Daily discharge, in second-feet, of Miller Creek near Lorella, Oreg., for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	Day.	Dec.	Jan.	Feb.	Mar.	Apr.
1	20	9.2	4.6	18	.....	16	5.0	306	14	152	.....
2	34	8.0	4.8	64	.....	17	5.6	270	8.4	367	.....
3	16	8.0	7.7	267	.....	18	5.0	202	6.5	582	.....
4	8.0	4.4	8.0	164	.....	19	5.6	228	5.0	640	.....
5	7.1	5.0	10	152	.....	20	5.6	162	3.6	561	12
6	6.2	.....	57	164	53	21	6.2	98	3.8	604	10
7	5.0	.....	410	152	56	22	7.1	34	4.2	626	8.0
8	4.4	.....	157	197	56	23	8.0	26	5.0	940	6.5
9	4.4	.....	92	81	72	24	11	22	7.4	964	4.6
10	3.8	.....	114	102	157	25	22	26	9.2	1,000	4.0
11	3.6	.....	114	81	76	26	20	18	10	1,060	4.8
12	2.7	6.5	44	87	44	27	17	17	13	604	4.8
13	2.7	.....	44	127	29	28	17	16	16	582	4.2
14	3.0	.....	36	182	29	29	17	16	.....	448	3.8
15	3.0	.....	17	190	.....	30	12	7.1	.....	462	3.0
						31	11	4.2	.....	462	.....

NOTE.—Mean discharge estimated as follows: Jan. 6–11, 6 second-feet; Jan. 13–15, 150 second-feet; Apr. 1–5, 250 second-feet; Apr. 15–19, 20 second-feet. Creek practically dry during October, November, and June to September.

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Monthly discharge of Miller Creek near Lorella, Oreg., for the year ending September 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December	34	2.7	9.65	593
January	306	4.2	63.9	3,930
February	410	3.6	43.8	2,430
March	1,060	18	390	24,000
April	.....	3.0	66.3	3,950
May	.....	.....	a1.5	92
The period	.....	.....	.....	35,000

a Estimated.

NOTE.—Creek bed practically dry during October, November, and June to September.

OLENE WASTEWAY AT OLENE, OREG.

LOCATION.—In SW. ¼ sec. 14, T. 39 S., R. 10 E., at flume on F canal of Klamath project that crosses Lost River at Olene, Klamath County, about 4 miles upstream, from Lost River dam.

RECORDS AVAILABLE.—Irrigation seasons, 1915 to 1918.

GAGE.—Records are kept of width of gate opening and of head of water on the orifice.

DISCHARGE MEASUREMENTS.—Made in flume above and below wasteway, and difference between the two measurements taken as outflow from wasteway.

ACCURACY.—Coefficient of discharge fairly well determined for discharge of 12 to 20 second-feet; somewhat uncertain outside of these limits. Gage and gate opening record to half-tenth once a day. Records for total yearly run-off fair.

COOPERATION.—Records furnished by United States Reclamation Service.

No current-meter measurements were made during the year.

The Olene wasteway is used to supply water from Link River to supplement the flow of Lost River when the latter is insufficient to supply the G canal. The records are used in obtaining the total natural flow of Lost River.

Daily discharge, in second-feet, of Olene wasteway at Olene, Oreg., for the year ending Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1	.....	36	28	10	16	75	27	81	.....
2	.....	22	28	19	17	75	27	81	.....
3	.....	7	28	28	18	75	26	68	.....
4	30	7	28	30	19	75	20	67	.....
5	28	27	28	30	20	75	14	68	.....
6	35	38	28	27	21	80	14	64	.....
7	32	52	28	12	22	75	19	50	5
8	34	70	38	12	23	75	25	51	.....
9	36	51	62	17	24	75	25	52	.....
10	55	51	81	23	25	50	26	36	.....
11	75	52	58	25	26	50	34	31	.....
12	56	43	69	21	27	50	43	24	.....
13	36	43	81	30	28	15	43	25	.....
14	36	43	69	45	29	15	68	23	.....
15	56	26	81	26	30	26	.....	24	.....
					31	26	.....	24	.....

NOTE.—Wasteway dry Oct. 1 to May 3, June 30, Aug. 16 to 21, and Aug. 23 to Sept. 30.

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Monthly discharge of Olene wasteway at Olene, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May, 28 days	80	15	50.8	2,820
June, 29 days	68	7	33.8	1,940
July	81	23	48.5	2,980
August, 16 days	45	5	22.5	714
The year				8,450

LOST RIVER DIVERSION CANAL NEAR KLAMATH FALLS, OREG.

LOCATION.—At corner of secs. 25 and 36, T. 39 S., R. 9 E., and secs. 30 and 31, T. 39 S., R. 10 E., at wagon bridge 10 miles southeast of Klamath Falls, Klamath County.

RECORDS AVAILABLE.—May 1, 1912, to September 30, 1918.

GAGE.—Two Gurley 7-day recorders. No. 1 installed at wagon bridge at station 85; No. 2 at a wagon bridge at station 330, or about 5 miles below No. 1. Gage readings have been recorded to same datum, which is 4,080 feet above sea level. Gage readers, United States Reclamation Service employees. Gages above and below the intake gates at the Lost River dam,[1] in SW. ¼ sec. 29, T. 39 S., R. 10 E., were read up to March 31, 1916, and openings of the three gates recorded.

DISCHARGE MEASUREMENTS.—Made from a footbridge near southeast corner of sec. 30, about a mile above gage No. 1, and about half a mile below intake of canal.

CHANNEL AND CONTROL.—Artificial canal having a normal section about 50 feet wide on bottom, with side slopes 2 to 1, slope 0.00008, and designed to carry 4 to 5 feet depth of water. Klamath River backs water normally up to head of canal.

EXTREMES OF DISCHARGE.—Maximum stage at gage No. 2 from water-stage recorder, 7.40 feet April 1 to 3; maximum discharge during year, 303 second-feet April 11, fall 1.12 feet).

1912–1918: Maximum discharge recorded, 508 second-feet February 28, 1914, for openings of 5.5 feet on all three gates and a head of 0.85 foot. Canal dry at times.

ICE.—Stage-discharge relation unaffected by ice.

ACCURACY.—Stage-discharge relation unstable, being influenced by backwater from Klamath River. Daily discharge ascertained according to the method outlined in Water-Supply Paper 345-E.[2] Normal rating curve fairly well defined for gage No. 2 from which stages have been used in making computations, gage No. 1 being used to obtain slopes. Operation of recorders satisfactory except at gage No. 1, March 18–22, and at gage No. 2, October 21–27, November 21–23, and January 13–18 and possibly at other times when operation of float may have been hampered by ice for short periods. Records fair.

COOPERATION.—Field data furnished by United States Reclamation Service.

Lost River diversion canal diverts water from Lost River into Klamath River to assist in lowering Tule Lake for the purpose of reclaiming the lake bed.

[1] This station has been referred to as "Lost River diversion canal near Olene."

[2] Hall, M. R., Hall, W. E., and Pierce, C. H., A method of determining the daily discharge of rivers of variable slope: U. S. Geol. Survey Water-Supply Paper 345, pp. 53–65, 1915.

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Discharge measurements of Lost River diversion canal near Klamath Falls, Oreg., during the year ending Sept. 30, 1918.

[Made by H. W. Humphrey.]

Date.	Gage height.		Discharge.
	Gage No. 1.	Gage No. 2.	
	Feet.	*Feet.*	*Sec.-ft.*
Dec. 15	7.12	6.12	115
Apr. 18	7.50	6.80	175

Daily discharge, in second-feet, of Lost River diversion canal near Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	90	85	96	128	152	136	303
2	89	81	100	126	147	136	297
3	88	77	102	131	141	141	295
4	88	77	101	129	133	149	300
5	88	78	100	129	133	169	268
6	85	78	98	128	135	198	278
7	87	79	99	128	141	208	268
8	85	79	99	128	147	215	260
9	87	79	100	128	182	210	262
10	88	81	103	132	214	212	255
11	88	84	106	129	210	212	253
12	88	86	106	133	202	218	249
13	88	86	106	.....	206	226	240
14	88	84	106	.....	206	218	239
15	88	83	113	.....	204	214	221
16	83	83	115	.....	174	206	197
17	82	83	118	.....	151	196	185
18	84	86	117	.....	145	202	171
19	86	86	116	155	136	239	160
20	87	86	116	201	131	261	151
21	.....	86	116	278	126	281	155
22	.....	86	116	284	128	281	147
23	.....	86	116	255	127	281	53
24	.....	86	116	231	133	289	0
25	.....	87	117	216	132	294	.....
26	.....	87	118	202	135	292	.....
27	.....	86	120	187	135	299	.....
28	84	87	121	178	139	297	.....
29	87	88	121	174	.....	289	.....
30	87	90	121	167	.....	289	.....
31	89	.....	123	162	.....	294	.....

NOTE.—Mean discharge estimated as follows: Oct. 21-27, 86 second-feet; Jan. 13-18, 144 second-feet.

Monthly discharge of Lost River diversion canal near Klamath Falls, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	90	82	86.6	5,320
November	90	77	83.7	4,980
December	123	96	110	6,760
January	284	126	165	10,100
February	214	126	155	8,610
March	299	136	231	14,200
April 1-23	303	53	228	10,400
The period	.....	.....	.....	60,400

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G CANAL NEAR OLENE, OREG.

LOCATION.—In SW. ¼ sec. 29, T. 39 S., R. 10 E., at intake at east end of Lost River dam, 4 miles south of Olene, Klamath County.

RECORDS AVAILABLE.—Irrigating seasons, 1912 to 1918.

GAGE.—Stevens 8-day water-stage recorder 200 feet below the intake (referred to as gage No. 1 in 1916).

DISCHARGE MEASUREMENTS.—Made from wagon bridge 1,500 feet below intake.

CHANNEL AND CONTROL.—Canal is of regular section, 16 feet wide on the bottom and practically permanent. No defined control; timber check at station 112 was not operated in 1917 or 1918 to any considerable extent.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during irrigating season, April 15 to September 30, 144 second-feet July 2 (gage height, 4.32 feet). Minimum stage recorded, 0.20 foot April 15 (discharge, 7 second-feet). Canal dry at times.

1912–1918, maximum discharge, that of 1918.

ACCURACY.—Stage-discharge relation unstable on account of growth of aquatic plants. Operation of recorder satisfactory except May 31 to June 7, when daily readings on staff gage were used. Rating curve for unobstructed channel well defined and applied April 15 to May 21; shifting-control method used thereafter; correction curve fairly well defined. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records good.

COOPERATION.—Field data and computations by United States Reclamation Service, Klamath project, J. B. Bond, project manager.

G canal diverts water from Lost River in SW. ¼ sec. 29, T. 39 S., R. 10 E., and irrigates land east of the lower part of the river and north of Tule Lake. Return waters reach both the river and the lake.

Discharge measurements of G canal near Olene, Oreg., during the year ending Sept. 30, 1918.

[Made by H. W. Humphrey.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 22	0.75	18.3	June 20	4.04	124	Aug. 7	4.23	118
May 1	2.58	95	26	4.23	123	21	3.36	66
10	3.10	128	July 13	3.77	116	Sept. 30	2.31	23.7
21	3.17	132	25	4.20	131			
June 8	3.49	122	30	4.33	133			

Daily discharge, in second-feet, of G canal near Olene, Oreg., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day	Apr	May	June.	July	Aug.	Sept.
1	.....	89	116	132	112	94	16	16	131	118	104	71	40
2	.....	92	113	141	98	93	17	15	127	117	102	66	35
3	.....	107	110	144	103	86	18	15	113	126	115	67	30
4	.....	112	111	143	111	84	19	14	121	137	114	66	39
5	.....	115	114	144	119	84	20	14	133	138	118	68	40
6	.....	117	110	141	123	86	21	14	131	139	124	68	42
7	.....	127	117	135	117	84	22	18	111	134	122	69	43
8	.....	125	119	119	116	83	23	27	116	134	124	70	41
9	.....	125	125	112	117	64	24	48	132	136	128	70	29
10	.....	127	123	134	119	54	25	56	127	136	131	74	29
11	.....	134	111	125	120	53	26	64	121	131	129	88	29
12	.....	129	114	116	114	52	27	68	118	130	126	89	28
13	.....	129	121	117	105	51	28	72	105	63	128	95	27
14	.....	138	120	114	97	50	29	75	100	137	133	94	28
15	7	136	119	105	82	45	30	78	112	132	134	95	24
							31	.....	116	.....	130	94	.....

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Monthly discharge of G canal near Olene, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April (16 days)	78	7	37.6	1,190
May	139	89	121	7,440
June	139	63	122	7,260
July	144	102	126	7,690
August	123	66	93.5	5,750
September	94	24	52.2	3,110
The period				32,400

LOWER KLAMATH LAKE NEAR MOUNT DOME, CALIF.

LOCATION.—In sec. 35, T. 47 N., R. 2 E., at Lairds landing, at extreme south end of Lower Klamath Lake, about 6 miles southeast of Brownell, Siskiyou County

RECORDS AVAILABLE.—January 23, 1907, to July 15, 1909; August 1, 1917, to August 12, 1918, when station was discontinued.

GAGE.—Vertical staff on northeast bent of wharf; datum, 4,083.18 feet above sea level; temporary gage during July, 1918; August 1, 1912, to August 14, 1915, datum 4,085 feet. Gage reader, Lawrence Laird. Gage used 1907 to 1909, in sec. 35; datum, 4,082.50 feet above sea level.

EXTREMES OF STAGE.—1907–1909 and 1912–1918: Maximum stage recorded, 2.4 feet, or 4,087.4 feet above sea level, April 28–29, 1914. Minimum stage recorded, 4,082.8 feet by levels October 2, 1918.

COOPERATION.—Record furnished by United States Reclamation Service, Klamath project.

Daily gage height, in feet, of Lower Klamath Lake near Mount Dome, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	84.9	84.9	84.9	85.1	85.1	85.1	85.1	84.9	84.6	.....	.....
2	84.9	84.9	84.9	85.1	85.1	85.1	85.1	84.9	84.6	84.0	.....
3	84.9	84.9	84.9	85.1	85.1	85.1	85.1	84.9	84.6	84.0	.....
4	84.9	84.9	84.9	85.1	.....	85.1	85.1	84.9	84.6	84.0	.....
5	84.9	84.9	84.9	85.1	85.1	85.1	85.1	84.8	84.6	84.0	.....
6	84.9	84.9	84.9	85.1	.....	85.1	85.1	84.8	84.6	84.0	.....
7	84.9	84.9	84.9	85.1	.....	85.1	.....	84.8	84.6	.....	.....
8	84.9	84.9	84.9	85.1	.....	85.1	.....	84.8	84.6	.....	.....
9	84.9	84.9	84.9	85.1	.....	85.1	85.1	84.8	84.5	.....	.....
10	84.9	84.9	84.9	85.1	85.1	85.1	85.1	84.8	84.5	.....	.....
11	84.9	84.8	84.9	85.1	85.1	85.1	85.1	84.8	84.5	.....	.....
12	84.9	84.8	84.9	85.1	85.1	85.1	85.1	84.8	84.5	.....	83.3
13	84.9	84.8	84.9	85.1	85.1	85.1	85.1	84.8	84.5	.....	.....
14	84.9	84.8	84.9	85.1	85.1	85.1	85.1	84.8	84.5	83.7	.....
15	84.9	84.8	84.9	85.1	85.1	85.1	85.0	84.8	84.5	83.7	.....
16	84.9	84.8	84.9	85.1	85.1	85.1	85.0	84.8	.....	83.7	.....
17	84.9	84.8	84.9	85.1	85.1	85.1	85.0	84.8	.....	83.7	.....
18	84.9	84.8	84.9	85.1	85.1	85.1	85.0	84.8	.....	83.7	.....
19	84.9	84.8	84.9	85.1	85.1	85.1	85.0	84.7	.....	.....	.....
20	84.9	84.8	84.9	85.1	85.1	85.1	85.0	84.7	.....	.....	.....
21	84.9	84.8	84.9	85.1	85.1	85.1	84.9	84.7	.....	.....	.....
22	84.9	84.8	84.9	85.1	85.1	85.1	84.9	84.7	.....	.....	.....
23	84.9	84.8	85.0	85.1	85.1	85.1	84.9	84.7	.....	.....	.....
24	84.9	84.8	85.0	85.1	85.1	85.1	84.9	84.7	.....	.....	.....
25	84.9	84.9	85.0	85.1	85.1	85.1	84.9	84.7	.....	.....	.....
26	84.9	84.9	85.0	85.1	85.1	85.1	84.9	84.6	.....	.....	.....
27	84.9	84.9	85.0	85.1	85.1	85.1	84.9	84.6	.....	.....	.....
28	84.9	84.9	85.0	85.1	85.1	85.1	84.9	84.6	.....	.....	.....
29	84.9	84.9	85.0	85.1	85.1	85.1	84.9	84.6	.....	.....	.....
30	84.9	84.9	85.0	85.1	.....	85.1	84.9	84.6	.....	.....	.....
31	84.9	.....	85.0	85.1	.....	85.1	.....	84.6	.....	.....	.....

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BEAVER CREEK NEAR LILYGLEN, OREG.

LOCATION.—In SW. ¼ sec. 32, T. 38 S., R. 4 E., one-eighth mile above Klum Creek, 6 miles southeast of former post office of Lilyglen and 22 miles east of Ashland, Jackson County

DRAINAGE AREA.—About 22 squre miles (measured on maps of United States Reclamation Service).

RECORDS AVAILABLE.—April 23 to June 14, 1916; October 21, 1916, to July 5, 1917; and February 1 to May 31, 1918.

GAGE.—Stevens 8-day recorder on left bank at same site as vertical staff used in 1916; datum 2.0 feet higher. Gage reader, Wm. Lindsay.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—Stream bed of silt and clay; current sluggish; probably will not shift materially.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.68 feet at 8 p. m. February 6 (discharge, 132 second-feet). Stream bed dry in summer.

ICE.—Stage-discharge relation affected by ice February 14 to March 4. Discharge estimated.

DIVERSIONS.—A little water is diverted above the station for irrigating meadows and watering stock.

ACCURACY.—Stage-discharge relation practically permanent, rating curve well defined. Operation of recorder satisfactory except during part of February, when water in float well may have been frozen. Daily discharge ascertained by applying to rating table the mean gage height obtained by inspecting the recorder graph. Records good except those for ice period, which are poor.

Discharge measurements of Beaver Creek near Lilyglen, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 1	J. B. Piatt [a]	1.08	20.2
Apr. 6	C. Z. Boyden [a]	1.10	35.5
6	.....do	1.08	35.2

[a] Engineers of Medford Irrigation District.

Daily discharge, in second-feet, of Beaver Creek near Lilyglen, Oreg., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May.	Day.	Feb.	Mar.	Apr.	May.
1	7	.....	62	12	16	.....	30	31	9
2	7	.....	53	12	17	.....	30	30	8
3	10	.....	46	12	18	.....	43	24	7
4	13	.....	43	10	19	.....	46	20	6
5	29	.....	38	11	20	.....	53	20	5
6	88	.....	35	10	21	.....	50	20	4
7	26	.....	31	9	22	.....	57	20	4
8	26	22	33	8	23	.....	54	18	4
9	26	20	47	14	24	.....	52	18	2
10	18	18	40	15	25	.....	64	17	2
11	17	16	34	10	26	.....	62	16	4
12	12	16	35	9	27	.....	60	14	8
13	10	18	45	8	28	.....	55	14	6
14	10	20	40	8	29	.....	54	13	4
15	10	22	35	9	30	.....	62	13	3
					31	.....	64	.....	2

NOTE.—Mean discharge estimated as 15 second-feet Feb. 16–28, and 20 second-feet Mar. 1–7.

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Monthly discharge of Beaver Creek near Lilyglen, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February	88	.....	18.0	1,000
March	64	.....	36.4	2,240
April	62	13	30.2	1,800
May	15	2	7.6	467
The period	.....	.....	.....	5,510

NOTE.—Total run-off not recorded; estimated as 2,000 acre-feet.

KEENE CREEK AT HYATT PRAIRIE, NEAR ASHLAND, OREG.

LOCATION.—In SW. ¼ sec. 16, T. 39 S., R. 3 E., near proposed dam site at Hyatt Prairie, 3 miles north of Green Spring Mountain road from Ashland to Klamath Falls and 20 miles from Ashland.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 1, 1917, to June 2, 1918; miscellaneous measurements in 1916.

GAGE.—Stevens Type A recorder on right bank 100 feet above proposed dam site. Inspected by engineers of Talent Irrigation District.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge near gage.

CHANNEL AND CONTROL.—Stream bed sand and clay, may shift in extreme floods; control of rocks and boulders, practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 3.65 feet at 2 a. m. January 12 (discharge, 186 second-feet). Creek channel practically dry at times during the summer, and early fall.

1917-1918: Maximum stage from water stage recorder 4.08 feet, Apr. 25, 1917, (discharge, 194 second-feet).

ICE.—Stage-discharge relation apparently affected by ice from about January 15 to 22, probably little if at all at other times.

DIVERSIONS.—Practically none above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of recorder satisfactory except December 5-13, when paper slipped. Daily discharge ascertained by applying to rating table the mean gage heights obtained by inspecting the recorder graph, or in case of days of considerable fluctuation, by subdividing days. Records good.

Discharge measurements of Keene Creek at Hyatt Prairie, near Ashland, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 16	Dillard and Cooper [a]	1.40	6.08	Apr. 27	F. C. Dillard [a]	1.65	15.8
Mar. 29	do	2.54	52.9	June 2	do	.44	1.0

[a] Engineers of Talent Irrigation District.

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Daily discharge, in second-feet, of Keene Creek at Hyatt Prairie, near Ashland, Oreg., for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	5.0	1.8	0.9	8.2	36	9.0	0.4
2	3.2	1.6	2.2	9.8	26	8.4	.2
3	1.1	2.1	4.8	8.0	22	7.8	.....
4	.8	4.6	4.9	6.1	21	7.6	.....
5	.8	2.8	6.6	5.5	21	8.2	.....
6	.....	3.7	35	5.2	21	6.8	.....
7	.....	5.2	11	5.0	21	6.2	.....
8	.....	1.7	7.0	5.0	24	6.1	.....
9	.....	3.5	6.8	5.0	31	10	.....
10	.....	2.0	7.5	5.0	29	9.6	.....
11	.....	28	7.2	5.1	26	6.4	.....
12	.....	95	3.5	4.8	27	5.1	.....
13	1.2	15	2.8	4.8	32	4.2	.....
14	1.0	6.6	3.3	5.4	25	5.0	.....
15	.4	12	.....	6.6	20	5.8	.....
16	4.2	10	.....	9.4	22	5.0	.....
17	10	21	.....	9.6	17	3.9	.....
18	4.6	19	.....	10	14	3.4	.....
19	7.4	10	.....	9.8	13	2.8	.....
20	4.2	6.3	.....	11	14	2.5	.....
21	5.8	6.4	.....	14	16	2.2	.....
22	3.0	6.5	.....	19	17	1.9	.....
23	2.6	7.6	6.7	22	17	1.6	.....
24	8.0	8.6	5.4	24	17	1.4	.....
25	4.9	14	4.9	36	17	1.4	.....
26	6.6	5.1	5.0	29	14	1.9	.....
27	4.7	5.4	5.8	24	13	3.6	.....
28	3.7	5.2	6.4	33	12	2.7	.....
29	2.8	5.2	.....	43	11	1.9	.....
30	2.2	5.0	.....	47	10	1.4	.....
31	2.1	2.5	.....	46	.....	.9	.....

NOTE.—Mean discharge estimated in 1.0 second-foot Dec. 6–12; and 4.0 second-feet February 15–22.

Monthly discharge of Keene Creek at Hyatt Prairie, near Ashland, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December	10	0.4	3.14	193
January	95	1.6	10.4	640
February	35	.9	6.06	337
March	47	4.8	15.4	947
April	36	1.0	20.2	1,200
May	10	.9	4.67	287
The period	.....	.....	.....	3,600

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SHASTA RIVER NEAR MONTAGUE, CALIF.

LOCATION.—In N. ½ NE. ¼ sec. 33, T. 45 N., R. 6 W., at highway bridge 1¼ miles southwest of Montague, Siskiyou County. Little Shasta River enters 1 mile above and Yreka Creek 5½ miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 24, 1911, to September 30, 1913; September 20, 1916, to September 30, 1918.

GAGE.—Vertical staff in two sections; lower section fastened to bridge pier on right bank; upper section to left abutment. Several changes in gage section have been made but original datum has been maintained. Gage read by D. S. Lucas and M. S. Merrill.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; fairly permanent. Banks are subject to overflow during very high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.1 feet March 19 (discharge, 440 second-feet); minimum stage recorded during year, 2.1 feet April 7 (discharge, from extension of rating curve, about 1.5 second-feet). Controlled by pumping above.

1911–1918: Maximum stage recorded, 4.3 feet at 9 a. m. January 19, 1913 (discharge, 712 second-feet); minimum stage recorded, 2.1 feet April 7, 1918 (discharge, 1.5 second-feet).

DIVERSIONS.—The Dwinnel ditch diverts about 30 second-feet 2 miles above the gage. The Grenada ditch diverts about 40 second-feet 12 miles above the gage. Some water is probably returned to the river above the gage. Other small ditches divert above the station. See miscellaneous measurements, page —.

REGULATION.—Considerable diurnal fluctuation at the gage due to itrigation above. Some water diverted for irrigation probably returns to river above the gage by seepage.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined between 25 and 400 second-feet and is an extension above and below. Gage read to tenths once daily from October 1 to June 30 and to quarter-tenths once daily from July 1, to September 30. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except those for irrigating season, which are fair.

Discharge measurements of Shasta River near Montague, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Sept. 13	3.03	84
23	3.23	127

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Daily discharge, in second-feet, of Shasta River near Montague, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	149	177	315	277	207	177	177	25	25	8	25	33
2	149	240	315	240	177	177	177	25	35	17	65	25
3	149	277	277	207	177	177	149	25	83	16	48	30
4	149	207	240	207	177	177	126	25	83	17	30	35
5	126	207	207	177	177	207	65	25	65	14	25	33
6	104	207	207	207	207	177	83	25	65	10	23	30
7	104	177	207	177	355	177	1.5	35	48	10	25	30
8	94	207	177	207	315	207	1.5	25	48	16	35	42
9	83	177	177	207	207	207	3.0	25	35	25	21	48
10	48	177	207	207	177	149	6	25	35	48	25	56
11	25	207	207	207	207	149	6	35	25	51	23	65
12	6	240	177	240	177	177	6	35	17	45	25	83
13	35	207	177	240	149	177	149	25	17	25	21	94
14	65	207	177	207	149	177	126	25	25	14	17	115
15	104	207	207	207	149	207	126	25	25	14	25	177
16	104	207	207	240	149	177	83	42	35	25	35	163
17	115	177	207	207	177	177	104	35	35	21	65	149
18	126	177	207	207	177	177	83	42	25	17	65	149
19	138	149	240	207	177	440	104	48	25	14	48	126
20	149	149	240	177	207	315	83	35	25	14	45	126
21	177	177	207	207	177	177	65	35	25	16	42	126
22	149	177	240	207	207	149	48	35	25	33	35	126
23	126	149	177	177	177	177	48	35	65	27	30	133
24	104	149	207	207	177	207	35	35	48	65	33	122
25	177	149	240	207	207	207	48	48	35	27	48	124
26	177	149	240	207	177	207	48	48	35	25	56	122
27	207	149	240	207	177	240	48	35	17	45	65	115
28	177	207	207	207	177	240	35	25	14	27	62	126
29	83	277	207	207	.....	207	25	25	10	27	56	126
30	83	207	296	207	.....	207	25	25	21	25	65	128
31	177	.....	277	177	.....	207	.....	25	.....	17	35	.....

Monthly discharge of Shasta River near Montague, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	207	6	118	7,260
November	277	149	192	11,400
December	315	177	223	13,700
January	277	177	209	12,900
February	355	149	192	10,700
March	440	149	201	12,400
April	177	1.5	69.5	4,140
May	48	25	31.5	1,940
June	83	10	35.7	2,120
July	65	8	24.4	1,500
August	65	17	39.3	2,420
September	177	25	95.2	5,660
The year	440	1.5	119	86,100

EAST FORK OF SCOTT RIVER AT CALLAHAN, CALIF.

LOCATION.—In SW. ¼ SW. ¼ sec. 16, T. 40 N., R. 8 W., in Shasta National Forest, at highway bridge at Callahan, Siskiyou County, 800 feet above junction with South Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 9, 1913 to September 30, 1918 (fragmentary).

GAGE.—Staff in two sections on left bank; lower section, inclined, fastened to cottonwood tree 10 feet above bridge; upper section, vertical, fastened to left abutment of bridge; read by F. H. Williams.

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DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Boulders and small gravel; practically permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.95 feet April 10 (discharge, 454 second-feet); minimum stage recorded, 5.0 feet October 8, 12, and July 31 (discharge, 4.2 second-feet).

1913–1918: Maximum stage recorded, 8.0 feet at 2 p. m. March 19, 1916 (approximate discharge, from extension of rating curve, 1,200 second-feet); minimum stage recorded, 4.9 feet August 31 and September 8, 1917 (discharge, 3.0 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation has not changed since station was established. Rating curve well defined below 15 second-feet and between 100 and 250 second-feet; rest of curve has been drawn by estimation. Gage read to hundredths occasionally. Daily discharge ascertained by applying gage height to rating table. Record, good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was made by J. F. Kunesh:
September 14, 1918: Gage height, 5.32 feet; discharge, 14 second-feet.

Daily discharge, in second-feet, of East Fork of Scott River at Callahan, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1							134					
2								204				
3			23			27		238				
4				23								
5			14		220		147					
6												
7			13									
8	4.2					28						
9				21			428		45			14
10			13				454	122				
11						27			38			
12	4.2	10		23								
13			10									
14					27							14
15				27			134			8.5	8.5	
16								89	20			
17		10	13			27	110			8.5		
18					12				19			
19												
20					110						8.5	
21		11					147		16			
22			13			69		60				
23												8.5
24			14									
25					32							
26		10				100						
27												
28	7				19		160	60				
29		160	32									
30				13								
31						134		60		4.2		

SCOTT RIVER AT CALLAHAN, CALIF.

LOCATION.—In NE. ¼ sec. 17, T. 40 N., R. 8 W., in Shasta National Forest, at highway bridge three-fourths of a mile below junction of East and South forks, 1 mile northwest of Callahan, Siskiyou County. Wildcat Creek enters 500 feet above and Sugar Creek 1½ miles below station.

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DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 12, 1911, to September 30, 1918 (fragmentary).

GAGE.—Vertical staff in three sections on right bank, installed November 14, 1912; original gage was just above power house about 2,000 feet above present site; present gage installed at independent datum, which on June 26, 1914, was raised 0.97 foot. Gage read by F. H. Williams.

DISCHARGE MEASUREMENTS.—Made from highway bridge at gage, or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.3 feet April 10 (discharge, 365 second-feet); minimum stage recorded, 0.55 foot August 27 (discharge, 6.5 second-feet).

1911–1918: Maximum stage recorded, 3.4 feet at 11.30 a. m. June 6, 1915 (discharge, 885 second-feet); minimum stage recorded, 0.55 foot August 27, 1918 (discharge, 6.5 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve fairly well defined. Gage read occasionally to hundredths. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was made by J. F. Kunesh:

September 14, 1918: Gage height, 1.14 feet; discharge, 43 second-feet.

Daily discharge, in second-feet, of Scott River at Callahan, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1								
2								
3				325				
4								
5			126					
6								
7								
8	9							
9					150			14
10			365	253				
11								
12	10			236				
13		104						
14								48
15			236			12	12	
16					74			
17			205			12		
18					66			
19								
20		205			60		12	
21			270					
22				162				
23								12
24								
25								
26		220						
27							6.5	
28	17		288	157				
29								
30		236						
31				150		9.5		

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INDIAN CREEK NEAR HAPPY CAMP, CALIF.

LOCATION.—In NW. ¼ sec. 22, T. 17 N., R. 7 E., in Klamath National Forest, at highway bridge at Robert's ranch, 4¾ miles north of Happy Camp, Siskiyou County, and junction with Klamath River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 8, 1911, to September 30, 1918 (fragmentary).

GAGE.—Staff in three sections installed at bridge November 20, 1912. No. 1, vertical, fastened to stump on right bank 2 feet above bridge; No. 2, vertical, fastened to right abutment of bridge near downstream end; No. 3, inclined, fastened to alder tree on left bank 12 feet below bridge. Original gage was vertical staff, fastened to alder tree on left bank about 700 feet above bridge at an independent datum. Gage read by M. M. Morgan.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; permanent.

EXTREMES OF DISCHARGE.—1911–1918: Maximum stage recorded, 10.6 feet February 17, 1912 (discharge, from extension of rating curve, about 8,430 second-feet); minimum stage recorded, 2.5 feet August 19 to September 6, 1914 (discharge, 20 second-feet).

DIVERSIONS.—The Reeve Davis Consolidated Mining Co.'s ditch diverts water above and returns it to the stream below the station; but none was diverted this year. Other small ditches use water for mining.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 35 and 2,500 second-feet. Gage read occasionally to half-tenths. Daily discharge ascertained by applying gage height to rating table.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was made by J. F. Kunesh:
September 16, 1918: Gage height, 2.82 feet; discharge, 50 second-feet.

Daily discharge, in second-feet, of Indian Creek near Happy Camp, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1												
2				265								38
3				295	235	395						
4												
5		57										
6	47				1,970		510		110			
7												
8	42					295	945	325	110			
9	42						945					
10					470							
11					450							
12												
13					412	395						
14							532					
15												
16												49
17						720				47		
18												
19			295		342							
20						720						
21												
22												
23			220									
24												
25						1,570						
26				295								
27												
28		57		235								
29						865						
30		2,930	430									38
31												

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TRINITY RIVER AT LEWISTON, CALIF.

LOCATION.—In NE. ¼ sec. 19, T. 33 N., R. 8 W., at highway bridge at Lewiston, Trinity County, 9 miles below Stewarts Fork. Indian Creek enters 6 miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 28, 1911, to September 30, 1918.

GAGE.—Vertical staff in two sections on left bank at bridge; lower section fastened to pile 10 feet above bridge; upper section fastened to downstream end of bridge abutment. Gage read by Leroy Phillips.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; practically permanent. Banks are subject to overflow at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.9 feet at 12 m. April 9 (discharge, 8,050 second-feet); minimum stage recorded, 1.85 feet September 3, 4, and 5 (discharge, 52 second-feet).

1911–1918: Maximum stage recorded, 16.7 feet at 12.30 p. m. January 2, 1914 (discharge, from extension of rating curve, about 26,900 second-feet); minimum stage recorded, 1.85 feet September 3, 4, and 5, 1918 (discharge, 52 second-feet).

DIVERSIONS.—Water is diverted above the station for irrigation, placer mining, and power development.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 50 and 8,000 second-feet; and extended above. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except those for very high water, which are probably good.

Discharge measurements of Trinity River at Lewiston, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Sept. 20	2.30	173
21	2.28	162

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Daily discharge, in second-feet, of Trinity River at Lewiston, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	102	94	3,520	668	335	980	3,250	2,730	835	189	82	58
2	107	94	1,140	700	363	1,020	2,860	2,990	765	180	82	62
3	102	107	700	695	370	1,140	2,230	2,990	800	171	82	52
4	87	230	575	635	363	1,140	1,890	3,120	835	180	82	52
5	87	195	460	635	575	1,020	1,780	2,600	870	171	82	52
6	87	300	390	575	4,840	942	1,780	2,230	835	165	82	58
7	87	223	363	870	3,120	835	1,890	2,230	835	165	82	58
8	87	195	342	668	1,580	835	1,780	2,230	800	150	82	62
9	94	159	307	575	1,480	835	7,250	1,780	765	150	82	62
10	87	159	307	435	1,220	800	4,840	1,780	700	135	72	66
11	87	230	282	460	1,060	1,020	4,090	1,780	635	135	66	72
12	87	515	293	575	980	1,220	3,800	1,480	575	135	66	82
13	87	435	282	635	1,620	1,100	2,990	1,580	575	135	62	227
14	87	328	265	635	905	980	2,470	1,680	515	129	58	870
15	82	237	265	605	800	905	2,230	1,390	435	135	72	488
16	107	237	293	570	835	905	2,110	1,300	402	135	87	307
17	87	230	318	575	765	1,060	2,230	1,300	370	121	82	223
18	94	212	342	905	732	4,690	2,350	1,220	352	121	87	195
19	94	202	335	765	700	3,940	2,470	1,140	335	121	82	180
20	87	189	307	700	700	2,730	2,730	1,140	300	121	82	165
21	94	189	300	635	700	2,230	3,250	1,060	300	107	82	150
22	94	189	272	575	732	2,230	3,520	1,060	293	107	94	159
23	94	165	293	545	1,060	2,350	3,520	1,060	293	113	82	150
24	94	165	300	515	1,390	2,350	3,250	1,060	265	107	82	159
25	94	180	272	488	1,060	3,520	3,380	980	258	94	82	150
26	94	165	1,300	488	1,060	3,120	3,120	980	230	94	82	135
27	94	165	2,230	460	1,020	2,600	2,730	835	230	94	72	129
28	94	171	2,000	435	980	2,230	2,470	765	212	87	66	129
29	94	202	1,390	410	.....	2,230	2,470	765	195	82	62	141
30	94	4,690	1,060	410	.....	2,730	2,600	800	195	82	62	141
31	94	.....	870	378	.....	3,520	.....	905	.....	82	62	.....

Monthly discharge of Trinity River at Lewiston, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	107	82	92.3	5,680
November	4,690	94	362	21,500
December	3,520	265	689	42,400
January	905	378	585	36,000
February	4,840	335	1,100	61,100
March	4,690	800	1,850	114,000
April	7,250	1,780	2,910	173,000
May	3,120	765	1,580	97,200
June	870	195	500	29,800
July	189	82	129	7,930
August	94	58	76.8	4,720
September	870	52	161	9,580
The year	7,250	52	832	603,000

TRINITY RIVER AT HOOPA, CALIF.

LOCATION.—In NW. ¼ sec. 25, T. 8 N., R. 4 E., at Hoopa Indian Agency, Humboldt County, 1 mile above Hoopa Ferry and 11 miles above junction with Klamath River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 3, 1911, to December 7, 1914, October 8, 1916, to September 7, 1918 (incomplete), when station was discontinued.

GAGE.—Staff in three sections on left bank 800 feet above mouth of Supply Creek; read by Oscar Brown.

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Discharge measurements.—Made from ferry cable 1 mile below gage. As Supply Creek enters between gage and ferry it is necessary to deduct discharge of this stream from measurements made at ferry to obtain flow at gage.

Channel and control.—Sand and gravel; fairly permanent. One channel at all stages.

Extremes of discharge.—Maximum stage recorded during year, 14.0 feet at 5.15 p. m. November 30 (discharge, 20,900 second-feet); minimum stage recorded, 4.08 feet September 6 and 7 (discharge, 230 second-feet).

1911–1918: Maximum stage recorded, 28.1 feet at 5 p. m. December 31, 1913 (discharge, from extension of rating curve, about 39,000 second-feet); minimum stage recorded, 4.08 feet September 6 and 7, 1918 (discharge, 230 second-feet).

Diversions.—None.

Regulation.—None.

Accuracy.—Stage-discharge relation permanent during year. Rating curve well defined below 1,300 second-feet, fairly well defined between 1,300 and 16,000 second-feet, and extended above. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

The following discharge measurement was made by J. F. Kunesh:
August 30, 1918: Gage height, 4.12 feet; discharge, 237 second-feet.

Daily discharge, in second-feet, of Trinity River at Hoopa, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,010	370	15,100	3,640	2,010	4,820	8,670	5,400	2,130	660	330	230
2	1,010	370	6,690	2,770	2,130	4,820	8,670	5,400	2,130	660	330	230
3	930	525	4,200	2,250	2,250	5,810	7,900	5,010	2,010	605	330	230
4	930	578	2,910	2,250	2,250	6,240	6,920	5,010	2,010	605	330	230
5	930	690	2,250	2,370	2,910	5,600	6,690	4,640	2,010	605	295	230
6	930	892	1,690	2,250	9,200	5,010	6,240	4,640	2,010	550	295	230
7	855	855	1,470	2,250	18,200	4,820	6,020	4,640	2,010	550	295	230
8	785	720	1,470	2,250	13,200	4,640	6,020	4,290	2,010	550	295	.....
9	785	660	1,380	2,250	8,670	4,640	12,300	3,960	2,010	500	295	.....
10	720	660	1,380	2,250	6,690	4,640	14,100	3,490	2,010	500	295	.....
11	660	752	1,380	2,370	5,400	4,640	9,740	3,490	1,900	500	295	.....
12	550	1,180	1,380	3,340	5,810	5,810	8,150	3,340	1,900	455	295	.....
13	500	1,570	1,380	4,290	5,600	6,690	7,160	3,340	1,900	455	295	.....
14	455	1,230	1,570	4,640	5,400	6,460	6,460	3,190	1,790	455	312	.....
15	410	1,050	1,680	4,290	5,400	5,600	6,460	3,190	1,790	455	330	.....
16	410	855	1,790	4,290	5,600	5,600	6,460	3,190	1,570	455	330	.....
17	370	720	1,790	5,200	5,400	6,240	6,460	3,190	1,570	455	330	.....
18	370	720	1,680	5,010	5,400	11,400	6,460	3,050	1,470	455	330	.....
19	350	660	1,680	4,640	5,010	17,800	6,460	2,910	1,380	455	330	.....
20	350	605	1,570	3,960	4,640	12,000	6,920	2,910	1,280	410	330	.....
21	330	605	1,570	3,640	4,640	9,470	6,920	2,770	1,180	410	330	.....
22	350	605	1,570	3,050	4,640	8,670	6,460	2,630	1,100	410	330	.....
23	370	605	1,470	2,500	4,460	9,200	6,460	2,500	1,010	410	330	.....
24	370	605	1,470	2,370	4,460	12,000	6,240	2,500	930	410	295	.....
25	370	605	1,570	2,250	4,640	14,700	6,240	2,370	930	370	295	.....
26	370	605	2,250	2,250	5,010	11,700	6,240	2,370	855	370	295	.....
27	370	632	8,150	2,250	5,400	10,600	5,810	2,370	785	370	295	.....
28	370	785	6,690	2,130	5,010	9,470	5,400	2,250	720	370	295	.....
29	370	1,570	5,690	2,130	.....	8,670	5,010	2,250	660	330	260	.....
30	370	16,400	5,010	2,010	.....	9,200	5,200	2,250	660	330	245	.....
31	370	.....	3,960	2,010	.....	8,940	.....	2,130	.....	330	230	.....

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Monthly discharge of Trinity River at Hoopa, Calif., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1,010	330	559	34,400
November	16,400	370	1,290	76,800
December	15,100	1,380	3,050	186,000
January	5,200	2,010	3,000	184,000
February	18,200	2,010	5,690	316,000
March	17,800	4,640	7,930	488,000
April	14,100	5,010	7,140	425,000
May	5,400	2,130	3,380	208,000
June	2,130	660	1,520	90,400
July	660	330	466	28,700
August	330	230	305	18,800
September 1-7	230	230	230	3,190
The period				2,060,000

SMITH RIVER BASIN.

MIDDLE FORK OF SMITH RIVER NEAR CRESCENT CITY, CALIF.

LOCATION.—In NE. ¼ SE. ¼ sec. 20, T. 17 N., R. 2 E., at highway bridge 800 feet above junction of North and Middle forks, one-eighth mile east of Gasquet, and 14 miles northeast of Crescent City, Del Norte County.

DRAINAGE AREA.—146 square miles.

RECORDS AVAILABLE.—September 8, 1911, to September 30, 1918 (not complete).

GAGE.—Inclined staff in two sections on right bank 40 feet upstream from new bridge. A chain gage attached to downstream guard rail of old bridge was read previous to May 26, 1913, and at various times since, when staff gage could not be read. Original datum was not maintained. Gage read by A. W. Lewis.

DISCHARGE MEASUREMENTS. Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; rough; somewhat shifting. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.4 feet at 2 p. m. November 30 (discharge, from extension of rating curve, about 12,700 second-feet); minimum stage recorded, 3.9 feet at 8.30 a. m. October 18 (discharge, 43 second-feet).

1911-1918: Maximum stage recorded, 17.5 feet at 1.30 p. m. November 25, 1915 (discharge, from extension of rating curve, about 14,300 second-feet); minimum stage recorded, 3.45 feet (chain gage) at 10 a. m. October 21, 1915 (discharge, 38 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 8,000 second-feet and extended above. Gage read to quarter-tenths once daily, sometimes twice. Daily discharge ascertained by applying mean daily gage-height to rating table.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Middle Fork of Smith River near Crescent City, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Sept. 10	4.01	53
Sept. 11	3.99	52

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Daily discharge, in second-feet, of Middle Fork of Smith River near Crescent City, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1			3,540	580	512		
2			1,580	490	720	720	
3	50	174	985	512	720	770	770
4		73	625	875	820		720
5		186	580	720	2,530	625	
6		121	410	625	7,460	670	
7		73	336	720	3,540	625	580
8		60	319	720	1,690	625	
9		55		720	1,450	1,170	1,240
10		55		625		1,170	
11	46			580		1,100	
12		302		3,540		1,530	
13		141		2,630	1,960	1,450	
14	46	88		2,130	1,610	1,170	
15		60		1,860	1,170		
16	46	60		1,380	2,430		535
17		60	720	1,040	2,960		535
18	43	50	820	1,770	1,950		535
19		50	625	1,610	1,380		535
20		50	535		1,040		535
21			490		930		
22			410	720	875		
23			410	625	930		
24			1,240	580	1,770		
25			770	535	2,130		
26			2,040	490			
27			1,950	450			
28		5,380		410			
29		5,120					
30		12,500		410			
31			670	372			

NORTH FORK OF SMITH RIVER NEAR CRESCENT CITY, CALIF.

LOCATION.—In SW. ¼ NE. ¼ sec. 20, T. 17 N., R. 2E., half a mile northeast of Gasquet, half a mile above junction of North and Middle forks, and 15 miles northeast of Crescent City, Del Norte County.

DRAINAGE AREA.—About 81 square miles.

RECORDS AVAILABLE.—September 8, 1911 to September 30, 1918 (incomplete).

GAGE.—Staff in four sections on left bank installed December 5, 1911; read by A. W. Lewis. The original gage was washed out November 15, 1911; its datum was not referred to that of present gage.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; rough. Control has not shifted since the present gage was installed. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 24.0 feet at 2 p. m. November 30 (discharge, from extension of rating curve, about 20,200 second-feet); minimum stage recorded, 9.3 feet at 9.30 a. m. November 3 (discharge, 132 second-feet).

1911–1918: Maximum stage recorded, 27.5 feet at 2.30 p. m. November 25, 1915 (discharge, from extension of rating curve, about 28,200 second-feet); minimum stage recorded, 8.49 feet at 9 a. m. October 30, 1915 (discharge, 62 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

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ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 13,000 second-feet and extended above. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records probably excellent.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of North Fork of Smith River near Crescent City, Calif., during the year ending Sept. 30, 1918.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Sept. 9	8.65	65
11	8.60	62

Daily discharge, in second-feet, of North Fork of Smith River near Crescent City, Calif., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1					590							
2				835	1,480	1,030						
3		132		745			790					
4				2,680	1,260							
5				2,280	6,350	1,030						
6					13,600	835						
7				2,280	4,480	790						
8			590	2,280	2,480	790						
9				1,640	2,000	2,680	2,680					
10				1,640								
11				1,560		2,100						
12		278		7,960		3,100						
13					2,990	2,190						
14				4,960	2,480	1,730						
15				3,210	2,100							
16				2,380	4,960		665					
17			3,210	2,100	5,630		625					
18			4,360	3,210	3,100		590					
19			2,000	2,190	2,190		555					
20			1,820		1,400		520					
21			1,640		1,260							
22			1,030	1,030								
23				835	1,030							
24			5,630	790								
25				745								
26			5,910	590								
27			5,910									
28				555								
29												
30		20,200		555								
31			1,260	520								

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MISCELLANEOUS MEASUREMENTS.

Measurements of stream flow in the Pacific slope basins of California at points other than gaging stations are listed in the following tables:

Miscellaneous discharge measurements in Pacific slope basins of California during the year ending Sept. 30, 1918.

Streams south of San Francisco Bay.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Mar. 10	Cottonwood Creek	Tia Juana River	SW. ¼ sec. 23, T. 18 S., R. 2 E., near Cottonwood.		5.1
10	Sweetwater River	Pacific Ocean	Dehesa		14
Jan. 1	Ellis flume	Diverts from Sweetwater River.	Opposite United States Geological Survey gaging station on Sweetwater River near Descanso.		.11
Aug. 8	do	do	do		.15
Mar. 7	San Diego River	Pacific Ocean	1 mile above diverting dam and one-eighth mile below Cedar Creek.		7.8
Nov. 7	Boulder Creek	San Diego River	Mouth	0.56	5.6
9	do	do	do	.36	1.8
Feb. 8	do	do	do	.80	19
Mar. 7	do	do	do	.43	4.4
Nov. 9	Cuyamaca Water Co.'s flume.	Diverts from San Diego River.	South Fork of San Diego River.	.54	3.5
10	do	do	do	.81	8.5
Feb. 8	do	do	do	1.52	22
Nov. 7	do	do	Chocolate Creek	.84	7.4
8	do	do	do	1.08	12
9	do	do	do	.56	3.6
10	do	do	do	.96	9.5
Feb. 8	do	do	do	1.51	23
Nov. 1	do	do	Grossmont	.38	1.5
7	do	do	do	.66	4.9
8	do	do	do	.90	9.3
9	do	do	do	.44	2.2
10	do	do	do	.25	1.3
Feb. 7	do	do	do	1.26	20
8	do	do	do	1.25	20
Sept. 7	do	do	do	.35	1.7
Feb. 8	South Fork of San Diego River.	San Diego River	Mouth	.12	.08
Mar. 7	do	do	do		.1
Nov. 7	South Fork flume	Diverts from South Fork of San Diego River.	Entire flow of South Fork diverted into flume.	3.70	1.6
8	do	do	do	3.66	1.2
9	do	do	do	3.65	1.1
Feb. 8	do	do	New gage installed	.42	1.9
Mar. 7	do	do	One-fourth mile above junction with Cuyamaca Water Co.'s flume.		4.6
Dec. 23	San Vicente Creek	San Diego River	Foster		.1
Mar. 8	do	do	do		.1
14	do	do	Foster. Stage 3.0 feet higher on March 12.		77
May 8	do	do	Foster		.1
Feb. 7	La Mesa ditch		Outlet near La Mesa	1.97	18
7	do		Intake near La Mesa	1.90	17
8	do		Intake near Grossmont	1.87	18
8	do		Outlet near La Mesa	1.94	16
Nov. 17	East San Pasqual ditch.	Diverts from Santa Ysabel Creek.	20 feet below intake		1.5
Dec. 25	do	do	do		3.8
Nov. 14	Escondido Creek	Pacific Ocean	San Elajo dam site on Santa Fe ranch near San Marcos.		.02
Jan. 26	do	do	do	2.40	11
30	do	do	do	2.00	.08
Feb. 18	do	do	do	2.17	1.2
22	do	do	do	2.28	4.8
27	do	do	do	2.09	.28
Mar. 8	do	do	do	2.28	3.6
13	do	do	do	2.85	107
16	do	do	do	1.50	13
23	do	do	do	1.54	12

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Miscellaneous discharge measurements in Pacific slope basins of California during the year ending Sept. 30, 1918—Continued.

Streams south of San Francisco Bay—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Mar. 28	Escondido Creek	Pacific Ocean	San Elijo dam site on Santas Fe ranch near San Marcos.	1.42	4.4
Apr. 6	do	do	do	1.39	2.7
11	do	do	do	1.28	1.7
18	do	do	do	1.20	1.0
Dec. 30	San Luis Rey River	do	500 feet below mouth of Agua Tibia Creek and 3 miles above Pala.		17
Dec. 16	do	do	Oceanside	8.72	7.5
Feb. 19	do	do	do	9.26	66
Mar. 24	do	do	do		45
Apr. 23	do	do	do	8.82	13
June 3	Temecula Creek	Santa Margarita River.	300 feet above junction with Murrietta Creek.		8.4
June 3	Murrietta Creek	do	Just above junction with Temecula Creek.		.8
July 25	Southern California Edison Co.'s canal.	Diverts from Santa Ana River.	Sand box just below Santa Ana River No. 2 power plant.		80
Jan. 31	do	do	200 feet above forebay at Santa Ana River No. 3 power plant.		44
July 25	do	do	400 feet above forebay at Santa Ana River No. 3 power plant.		75
Jan. 21	do	Diverts from San Gabriel River.	Tunnel 4A		29
30	do	do	do		31
July 18	do	do	do		47
Jan. 21	Azusa canal		300 feet below Southern California Edison Co.'s power plant near Azusa.		20
30	do		do		22
30	Duarte canal		Three-eighths mile below Southern California Edison Co.'s power plant near Azusa.		8
Oct. 24	Eaton Creek	Rio Hondo	Air to air tunnel		.05
24	do	do	Tollhouse bridge		0
24	do	do	Lower intake dam		0
24	do	do	Second point of measurement.		0
24	do	do	Below tunnel intake		0
Oct. 16	Millard Creek	Arroyo Seco	Mouth		0
Nov. 3	do	do	do		0
Dec. 1	Ditch	Divert from Tujunga Creek.	6 feet above sand box near Bryant's spring.		2.0
1917.					
Jan. 4	West Fork of Sespe Creek.	do	Mouth	2.23	10
4	Coldwater Creek	do	do	1.87	2.0
4	Little Sespe Creek	do	do	1.50	2.8
Aug. 2	Fillmore Land & Water Co.'s canal.	Diverts from Sespe Creek.	1,000 feet below intake		20
May 21	West Fork of Gavioto Creek.	Pacific Ocean	One-fourth mile above junction with Canada del Los Cruces.		1.1
May 23	Santa Ynez River	do	300 feet above junction with Mono Creek.		18
June 14	do	do	Just above junction with Mono Creek.		7.0
Aug. 1	do	do	do		1.0
May 22	do	do	450 feet above mouth of Santa Cruz Creek.		67
July 30	do	do	300 feet above mouth of Santa Cruz Creek.		4.6
May 22	do	do	San Lucas Bridge, 3½ miles southeast of Santa Ynez.		104
July 30	do	do	do		9.6
May 23	Mono Creek	San Ynez River	50 feet above mouth		21
June 14	do	do	Just above mouth		8.3
Aug. 1	do	do	do		2.0
May 23	Camuesa Creek	do	do		2.2
June 14	do	do	do		.7
Aug. 1	do	do	do		.4

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Miscellaneous discharge measurements in Pacific slope basins of California during the year ending Sept. 30, 1918—Continued.

Streams south of San Francisco Bay—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1917.				*Feet.*	*Sec.-ft.*
May 23	Gidney Creek	San Ynez River	Mouth. Stream enters from south 1 mile below Camuesa Creek.		1.0
June 14	do	do	do		.24
May 24	Devils Canyon Creek	do	Mouth. Stream enters from south 1,000 feet below Gibraltar dam.		.6
May 31	do	do	do		.3
June 14	do	do	do		.13
May 22	Santa Cruz Creek	do	300 feet above mouth		20
July 30	do	do	do		2.3
Aug. 4	San Lorenzo River	Pacific Ocean	1,500 feet above bridge at old powder mill near Santa Cruz.		8.6

Tulare Lake basin.

June 24	Deer Creek	Tulare Lake	Highway bridge on Porterville, Hot Springs road, near Porterville, Calif.		.1
24	North Fork of Tule River.	Tule River	Milo, Calif.		.2

San Joaquin River basin.

Nov. 10	San Joaquin River	Suisun Bay	North Fork, Calif.	7.60	373
Oct. 30	Miami Creek	Fresno River	Miami Lodge, near Nipinnawasee, Calif.		3.0
31	Sugar Pine Lumber Co.'s flume.	Diverts from Fresno River.	Knowles, Calif.		6.5
31	do	do	do		11.2
Aug. 22	Fresno flume	do	do		3.6
Oct. 24	Merced River	San Joaquin River	Sentinel Bridge, at Yosemite, Calif.	2.19	15
Sept. 16	do	do	do	2.95	174
Nov. 1	do	do	300 feet above mouth, near Newman, Calif.		71
Oct. 29	Big Creek	South Fork of Merced River.	200 feet above mouth, at Wawona, Calif.		10
June 25	Upper Eleanor Creek	Lake Eleanor	One-fourth mile above mouth near Sequoia, Calif.		131
July 9	do	do	500 feet above lake near Sequoia, Calif.		33
June 25	Frog Creek	do	50 feet above mouth near Sequoia, Calif.		30
July 9	do	do	Weir 800 feet above lake near Sequoia, Calif.		16
June 25	Kibbie Creek	do	800 feet above mouth near Sequoia, Calif.		6
July 9	do	do	do		2
Nov. 16	Golden Rock ditch	South Fork of Tuolumne River.	Abandoned United States Geological Survey gaging station 800 feet below intake at Harden ranch, near Sequoia, Calif.	1.22	11
July 26	Clavey Creek	Tuolumne River	At abandoned United States Geological Survey gaging station near Tuolumne, Calif.	10.03	32
26	North Fork of Tuolumne River.	do	Opposite Tuolumne ranger station, near Tuolumne, Calif.		3.8
Oct. 1	Stanislaus River	San Joaquin River	Stanislaus, Calif.		325
2	do	do	do		453
18	North Fork of Stanislaus River.	Stanislaus River	400 feet above mouth		11
22	do	do	do		13
7	do	do	100 feet above Griswold Creek.		5.9
7	Mill Creek	North Fork of Stanislaus River.	Mouth		.5

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Miscellaneous discharge measurements in Pacific slope basins of California during the year ending Sept. 30, 1918—Continued.

San Joaquin River basin—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Oct. 7	Griswold Creek	North Fork of Stanislaus River.	Mouth		3.6
1-11	Rose Creek	do	do		.0
July 31	North main of Oakdale canal.	Diverts from Oakdale canal, which diverts from Stanislaus River.	800 feet below point of diversion, near Knights Ferry, Calif.	2.40	60
July 4	Licking Fork of Mokelumne River.	Mokelumne River	Abandoned United States Geological Survey station near Railroad Flat, Calif.	1.88	1.4
Feb. 16	Bellota Slough	Calaveras River	Bellota, Calif.	.99	105

Sacramento River basin.

Nov. 26	Sacramento River	Suisun Bay	Hamilton, Calif.		4,785
25	do	do	Butte City, Calif.	0	5,178
23	do	do	Colusa, Calif.	.43	5,147
22	do	do	Knights Landing, Calif.		5,470
30	North Fork of Pit River.	Pit River	Alturas, Calif.		11
May 27	do	do	do		3.6
June 27	do	do	do		1.9
July 26	Montgomery Creek	do	Montgomery Creek, Calif.		17
Nov. 26	Stoney Creek	Sacramento River	St. Johns, Calif.		2
24	Butte Slough	do	100 feet above mouth at Colusa, Calif.		115
24	Sycamore Slough	do	Sycamore, Calif.		0
Oct. 7	Bear River	Feather River	Abandoned gaging station near Colfax, Calif.	[a] 1.80	4.0
May 7	do	do	do	2.35	48
July 18	do	do	do	[a] 1.05	1.3

Streams north of San Francisco Bay.

Aug. 27	Eel River	Pacific Ocean	Dos Rios, Calif.		4.1
29	do	do	Fernbridge, Calif.	—0.4	51
27	South Eel River	Eel River	Dos Rios, Calif.		0
28	South Fork of Eel River.	do	Gaberville, Calif.	—0.36	27
29	Van Duzen River	do	Alton, Calif.		0
30	North Fork of Mad River.	Mad River	Korbel, Calif.		0
30	Redwood Creek	Pacific Ocean	Bairs, Calif.	5.25	4.0
30	do	do	Orick, Calif.	4.20	3.6
Sept. 23	Shasta River	Klamath River	500 feet above Lucerne pumping plant at Grenada.		99
23	do	do	200 feet above Dwinnel pumping plant at Montague.		126
23	Big Springs outlet	Shasta River	Mayten, Calif.		27
23	Mount Shasta Land and Irrigation ditch.	Diverts from Big Springs reservoir.	do		41
23	Stallcup ditch	do	do		6.8
23	Grenada ditch	Diverts from Shasta River.	200 feet below Lucerne pumping plant at Grenada.		25
16	Reeve-Davis Consolidated Mining Co.'s flume.	Diverts from Indian Creek.	Happy Camp, Calif.		0
Aug. 30	Supply Creek	Trinity River	Hoopa, Calif.		3.2
Sept. 6	South Fork of Smith River.	Smith River	Crescent City, Calif.		103

[a] Staff out of water: gage reading not very accurate.

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Miscellaneous discharge measurements in Pacific slope basins of California during the year ending Sept. 30, 1918—Continued.

Klamath River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
May 8	Irvine Creek	Williamson River above Klamath Marsh.	Jackson Ranch		13.2
Apr. 30	Big Spring Creek	Williamson River, in Klamath Marsh.	Below tributary on Lenz ranch, in sec. 22, T. 30 S., R. 8 E.		44.7
Oct. 23	Brown Creek	Sprague River	Near dam, just below spring		7.3
May 5	do	do	do		6.3
25	Sycan River	do	Lower end of Sycan Marsh		38.7
9	Choctoot Creek	Sycan River	Border of Sycan Marsh, in sec. 10, T. 32 S., R. 14 E.		1.3
13	Coyote Creek	do	West side of Sycan Marsh		2.4
Aug. 5	Lost River	Tule Lake	Harpould's dam		43.9
5	do	do	Brotherton ranch, in sec. 21, T. 39 S., R. 11½ E.		38.6
Oct. 19	Fort Creek	Wood River	Near Fort Klamath, in sec. 26, T. 33 S., R. 7½ E.	1.35	86
May 28	do	do	do	1.65	79
Oct. 19	Crooked Creek	do	Klamath Agency, in sec. 13, T. 34 S., R. 7½ E.	1.62	88
May 28	do	do	do	1.08	74
Mar. 21	Jenny Creek	Klamath River	Klamath road crossing, in sec. 34, T. 39, S, R. 4 E.		112
21	Johnson Creek	Jenny Creek	Near Pinehurst		18.9

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STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

PART XI. PACIFIC SLOPE BASINS IN CALIFORNIA

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STREAM-GAGING STATIONS AND PUBLICATIONS RELATING TO WATER RESOURCES.

INTRODUCTION.

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, ground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the annual reports, bulletins, professional papers, and monographs.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below:

Part I. North Atlantic slope basins.
II. South Atlantic slope and eastern Gulf of Mexico basins.
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.
IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins, in three volumes:
A, Pacific slope basins in Washington and upper Columbia River basin.
B, Snake River basin.
C, Lower Columbia River basin and Pacific slope basins in Oregon.

HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below:

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

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2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Boston, Mass., 2500 Customhouse.
Albany, N. Y., 704 Journal Building.
Harrisburg, Pa., care of Water Supply Commission of Pa.
Asheville, N. C., 33–35 Broadway.
Chattanooga, Tenn., 605 Temple Court Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
Chicago, Ill., 1404 Kimball Building.
Ames, Iowa, care of State Highway Commission.
Helena, Mont., 52 Montana National Bank Building.
Topeka, Kans., 23 Federal Building.
Denver, Colo., 403 New Post Office Building.
Salt Lake City, Utah, 313 Federal Building.
Boise, Idaho, 615 Idaho Building.
Idaho Falls, Idaho, 228 Federal Building.
Austin, Tex., Capitol Building.
Portland, Oreg., 606 Post Office Building.
Tacoma, Wash., 406 Federal Building.
San Francisco, Calif., 328 Customhouse.
Los Angeles, Calif., 619 Federal Building.
Honolulu, Hawaii, 25 Capitol Building.

A list of the Geological Survey's publications may be obtained by applying to the Director of the United States Geological Survey, Washington, D. C.

STREAM-FLOW REPORTS.

Stream-flow records have been obtained at more than 4,510 points in the United States, and the data obtained have been published in the reports tabulated below.

Stream-flow data in reports of the United States Geological Survey.

[A—Annual Report; B—Bulletin; W—Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
	Gage heights (also gage heights for earlier years)	1896.

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Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River, and western United States.	1898.
20th A, pt. 4	Monthly dischrge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	1905.
W 201 to 214	do	1906.
W 241 to 252	do	1907–8.
W 261 to 272	do	1909.
W 281 to 292	do	1910.
W 301 to 312	do	1911.
W 321 to 332	do	1912.
W 351 to 362	do	1913.
W 381 to 394	do	1914.
W 401 to 414	do	1915.
W 431 to 444	do	1916.
W 451 to 464	do	1917.
W 471 to 484	do	1918.

NOTE.—No data regarding stream-flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1918. The data for any particular station will in general be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1918, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, 401, 431, 451, and 471, which contain records for the New England streams from 1903 to 1918. Results of miscellaneous measurements are published by drainage basins.

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In these papers and in the following lists the stations are arranged in downstream order. The main stem of any river is determined by measuring or estimating its drainage area—that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. All stations from the source to the mouth of the main stem of the river are presented first, and the tributaries in regular order from source to mouth follow, the streams in each tributary basin being listed before those of the next basin below.

In exception to this rule the records for Mississippi River are given in four parts, as indicated on page III, and the records for large lakes are taken up in order around the rim of the lake.

PRINCIPAL STREAMS.

The rivers draining into the Pacific Ocean from California include San Diego, San Dieguito, San Luis Rey, Santa Ana, San Gabriel, Los Angeles, Santa Ynez, Santa Maria, and Salinas rivers, draining areas south of San Francisco Bay; San Joaquin River, whose chief tributaries are Kings, Merced, Tuolumne, Stanislaus, Calaveras, and Mokelumne rivers; Sacramento River, whose principal tributaries are Pit, Feather, and American rivers; and Russian, Eel, Mad, Klamath, and Smith rivers, which flow into the ocean north of San Francisco Bay. Except Klamath River, which receives the drainage from a small area in Oregon, and a few streams in Oregon that flow into Goose Lake, at the head of Pit River, all the streams in this division are entirely in California.

In addition to the list of gaging stations and the annotated list of publications relating specifically to the section, these pages contain a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects, and also brief references to reports published by State and other organizations. (See p. xxiv.)

GAGING STATIONS.

NOTE.—Dash following a date indicates that the station was being maintained September 30, 1918; period after date indicates discontinuance.

DRAINAGE BASINS SOUTH OF SAN FRANCISCO BAY.

Tia Juana River near Nestor, Calif., 1915.
- Cottonwood Creek near Morena reservoir, Calif., 1916.
- Cottonwood Creek near Dulzura, Calif., 1906–1915.
  - Dulzura conduit near Dulzura, Calif., 1909–1915.
  - Pine Valley Creek near Jamul, Calif., 1906–1908.

Sweetwater River near Descanso, Calif., 1905–
Sweetwater River near Dehesa, Calif., 1913–1916.
Sweetwater River at Sweetwater dam, Calif., 1916.
San Diego River at diverting dam, near Lakeside, Calif., 1912–1916.
San Diego River at Lakeside, Calif., 1905–1916.
San Diego River near Santee, Calif., 1912–

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Numbers of water-supply papers containing results of stream measurements, 1899–1918.

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII North Pacific slope basins.		
North Atlantic slope.	South Atlantic slope and eastern Gulf of			Hudson Bay and							Pacific		

Santa Ana River tributaries—Continued.
Waterman Canyon Creek near San Bernardino, Calif., 1911–1914.
Devil Canyon Creek near San Bernardino, Calif., 1911–1914.
Lytle Creek at mouth of canyon, near San Bernardino, Calif., 1894–1901; 1904–
Lytle Creek at San Bernardino, Calif., 1916.
South Fork of San Jacinto River at Hemet reservoir, near San Jacinto, Calif., 1916.
San Jacinto River near Elsinore, Calif., 1916–
Elsinore Lake at Elsinore, Calif., 1915–
Temescal Creek near Elsinore, Calif., 1916–
Temescal Creek near Rincon, Calif., 1899.
Coldwater Creek above dam, Riverside County, Calif., 1899.
San Antonio Creek near Claremont, Calif., 1916–
San Antonio Creek near Upland, Calif., 1901–1917.
Southern California Edison Co.'s canal near Claremont, Calif.,[2] 1917–
San Gabriel River above Fish Fork, near Azusa, Calif., 1900–1901; 1910; 1912. (Low-water records.)
San Gabriel River at headworks near Azusa, Calif., 1912–1914.
San Gabriel River near Azusa, Calif., 1894–
Southern California Edison Co.'s canal near Azusa, Calif.,[3] 1896–
West Branch of North Fork of San Gabriel River at weir, 1900.
North Branch of North Fork of San Gabriel River at weir, 1900.
West Fork of San Gabriel River above North Fork, Calif., 1900.
Coldwater Creek at weir above mouth, 1900.
Fish Fork of San Gabriel River near Azusa, Calif., 1900–1901; 1910; 1912. (Low-water record.)
Iron Fork of San Gabriel River near Azusa, Calif., 1900–1901; 1910; 1912. (Low-water record.)
Tunnel diversion near Azusa, Calif., 1917–
Rogers Creek near Azusa, Calif., 1916–
Fish Creek near Duarte, Calif., 1916–
Sawpit Creek at Monrovia, Calif., 1916–
Monrovia pipe line near Monrovia, Calif., 1916–
Santa Anita Creek near Sierra Madre, Calif., 1916–
Little Santa Anita Creek near Sierra Madre, Calif., 1916–
San Dimas Creek near San Dimas, Calif., 1916–
Eaton Creek near Pasadena, Calif., 1918–
Los Angeles River at Los Angeles, Calif., 1896–1900; 1916.
Los Angeles River between Dominguez Junction and Cerritos, Calif., 1916.
Pacoima Creek near San Fernando, Calif., 1916–
Tujunga Creek near Sunland, Calif., 1916–
Haines Creek near Tujunga, Calif., 1917–
Arroyo Seco near Pasadena, Calif., 1910–
Arroyo Seco at Los Angeles, Calif., 1916.
Malibu Creek near Calabasas, Calif., 1903–1906.
Triunfo Creek near Calabasas, Calif., 1903–1906.
Santa Clara River at Fillmore, Calif., 1911–12.
Piru Creek near Piru, Calif., 1911–1913.
Sespe Creek near Sespe, Calif., 1915–1918.
Sespe Creek at Sespe, Calif., 1911–1913.
Santa Paula Creek near Santa Paula, Calif., 1911–1913.
Ventura River near Nordhoff, Calif., 1911–1914

[2] Formerly published as "Pacific Light & Power Co.'s canal near Claremont, Calif."
[3] Formerly published as "Pacific Light & Power Co.'s canal near Azusa, Calif."

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Ventura River near Ventura, Calif., 1911–1914.
Carpinteria Creek:
    Gobernador Creek near Carpinteria, Calif., 1916–
San Roque Creek, Santa Barbara County, Calif., 1890.
San Jose Creek, Santa Barbara County, Calif., 1890.
Loma Abajo River, Santa Barbara County, Calif., 1890.
Gato Creek at mouth, Santa Barbara County, Calif., 1890.
Santa Ynez River near Santa Barbara, Calif., 1903–1908; 1910–1918.
Santa Ynez River near Lompoc, Calif., 1906–1918.
    Mono Creek at Mono dam site, near Santa Barbara, Calif., 1902–1904.
    Mission tunnel near Santa Barbara, Calif., 1912–1917.
Santa Maria River near Santa Maria, Calif., 1903–1906.
Salinas River near Salinas, Calif., 1900–1901.
    Nacimiento Creek near Bryson, Calif., 1901.
    San Antonio River near Jolon, Calif., 1900–1901.
    San Lorenzo Creek near King City, Calif., 1900–1903; 1912.
    Arroyo Seco near Soledad, Calif., 1901–
Pajaro River at Watsonville, Calif., 1911–1913.

SAN FRANCISCO BAY.

MINOR STREAMS.

Coyote River near Madrone, Calif., 1902–1912; 1916–
Coyote River at Coyote, Calif., 1916–
Coyote River near Edenvale, Calif., 1916–
Coyote River at San Jose, Calif., 1916–17.
    Laguna Seca near Coyote, Calif., 1918.
    Laguna Seca at Coyote, Calif., 1916–
Alameda Creek at Sunolglen, Calif., 1900–
Alameda Creek near Niles, Calif., 1916–
Alameda Creek near Decoto, Calif., 1916–
    Spring Valley Water Co.'s aqueduct near Sunolglen, Calif., 1903–
    Crandall Slough near Centerville, Calif., 1916–
    Laguna Creek near Irvington, Calif., 1916–
    Dry Creek near Decoto, Calif., 1916–

SAN PABLO CREEK BASIN.

San Pablo Creek near San Pablo, Calif., 1917–
San Pablo Creek at San Pablo, Calif., 1917–

KERN RIVER BASIN.

Kern River near Kernville, Calif., 1912–
Kern River at Kernville, Calif., 1905–1912.
Kern River at Isabella, Calif., 1910–1912.
Kern River at Rio Bravo ranch, Calif., 1878–1884.
Kern River near Bakersfield, Calif., 1894–
    Kern River Power Co.'s canal at Kernville, Calif., 1910–1914.
    South Fork of Kern River near Onyx, Calif., 1911–1914.
    South Fork of Kern River at Isabella, Calif., 1910–1913.
    Erskine Creek near Bodfish, Calif., 1911–1916.
    Caliente Creek at base of foothills, Kern County, Calif., 1878–1884.
        Basin Creek near Havilah, Calif., 1911–1913.
    Tejon House Creek at Tejon ranch house, Calif., 1895–96.
    San Emigdio Creek at San Emigdio ranch house, Calif., 1894–95.

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TULARE LAKE BASIN.

Tulare Lake in Kings County, Calif., 1906–
Poso Creek at base of foothills, Kern County, Calif., 1878–1884.
White River at base of foothills, Tulare County, Calif., 1878–1884.
White River near Hot Springs, Calif., 1911–1913.
Deer Creek at base of foothills, Tulare County, Calif., 1878–1884.
Deer Creek at Hot Springs, Calif., 1910–
    Tyler Creek near Hot Springs, Calif., 1911–1913.
Tule River, North Fork of Middle Fork, near Springville, Calif., 1909–1913.
Tule River near Porterville, Calif., 1901–
Tule River at Porterville, Calif., 1878–1884.
    South Fork of Middle Fork of Tule River near Springville, Calif., 1909–1913.
    Bear Creek near Springville, Calif., 1911–1916.
    South Fork of Tule River near Porterville, Calif., 1910–
Kaweah River, Middle Fork, near Hammond, Calif., 1913.
Kaweah River at Wachumna Hill, Calif., 1878–1884.
Kaweah River near Three Rivers, Calif., 1903–
    Marble Fork of Kaweah River near Ranger, Calif., 1913.
    East Fork of Kaweah River near Hammond, Calif., 1913.
    North Fork of Kaweah River near Kaweah, Calif., 1913.
    North Fork of Kaweah River at Kaweah, Calif., 1910–
    South Fork of Kaweah River near Three Rivers, Calif., 1911–
Kings River at Suspension Bridge, Calif., 1895.
Kings River near Sanger, Calif., 1895–
Kings River at Slate Point, Calif., 1878–1884.
Kings River at Kingsburg, Calif., 1891–1904.
    Dinkey Creek near Ockenden, Calif., 1910–1915.
    Big Creek near Tollhouse, Calif., 1911–1914.
        Rush Creek near Ockenden, Calif., 1910–1913.

SAN JOAQUIN RIVER BASIN.

San Joaquin River Basin near Shaver, Calif., 1912–1915.
San Joaquin River near North Fork, Calif., 1910–1914.
San Joaquin River near Friant, Calif., 1907–
San Joaquin River near Hamptonville, Calif., 1878–1884.
San Joaquin River at Herndon, Calif., 1891–1909.
San Joaquin River near Newman, Calif., 1912–
    Big Creek near Big Creek, Calif., 1910–1915.
        Pitnam Creek at Big Creek, Calif., 1910–1915.
    Stevenson Creek at Shaver, Calif., 1916–1917.
    Fresno Flume & Lumber Co.'s upper flume at Shaver, Calif., 1915–1917.
    Fresno Flume & Lumber Co.'s lower flume at Shaver, Calif., 1916–1917.
    North Fork Creek near North Fork, Calif., 1910–11.
        Crane Valley reservoir near North Fork, Calif., 1910–1915.
        Evaporation from Crane Valley reservoir near North Fork, Calif., 1910–1915.
        South Fork Creek near North Fork, Calif., 1910–1915.
            South Fork ditch near North Fork, Calif., 1910; 1913.
        Whiskey Creek near North Fork, Calif., 1910–1915.
        Cascadel Creek near North Fork, Clif., 1910–1912.
    Fresno River at base of foothills, Madera County, Calif., 1878–1884.
    Fresno River near Knowles, Calif., 1911–
        Nelder Creek near Fresno Flats, 1910–1912.
        North Fork of Fresno River near Sugar Pine, Calif., 1910–1912.

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San Joaquin River tributaries—Continued.
Chowchilla Creek at base of foothills, near Buchanan, Calif., 1878–1884.
Mariposa Creek at base of foothills, Mariposa County, Calif., 1878–1884.
Bear Creek at base of foothills, Merced County, Calif., 1878–1884.
Merced River above Illilouette Creek, near Yosemite, Calif., 1915–16.
Merced River at Happy Isles Bridge, near Yosemite, Calif., 1915–
Merced River at Pohono Bridge, near Yosemite, Calif., 1916–
Merced River at Yosemite, Calif., 1904–1909; 1912–1916.
Merced River at Exchequer, Calif., 1915–
Merced River near Merced Falls, Calif., 1901–1913.
Merced River at Merced Falls, Calif., 1878–1884.
Merced River near Newman, Calif., 1912.
Illilouette Creek near Yosemite, Calif., 1915–16.
Tenaya Creek near Yosemite, Calif., 1904–1909; 1912–
Yosemite Creek at Yosemite, Calif., 1904–1909; 1912–
South Fork of Merced River near Wawona, Calif., 1910–
Big Creek near Wawona, Calif., 1910–11.
Tuolumne River at Hetch Hetchy cabin, near Sequoia, Calif., 1910–1916.
Tuolumne River at Hetch Hetchy dam site, near Sequoia, Calif., 1901; 1910–1915.
Tuolumne River below Hetch Hetchy dam site, near Sequoia, Calif., 1914–
Tuolumne River near Buck Meadows [Groveland], Calif., 1907–
Tuolumne River above La Grange dam, near La Grange, Calif., 1915–
Tuolumne River near La Grange, Calif., 1895–1917.
Tuolumne River at Modesto, Calif., 1878–1884; 1891–1897.
Falls Creek near Sequoia, Calif., 1915–
Cherry Creek near Sequoia, Calif., 1901; 1910–
Eleanor Creek near Sequoia, Calif., 1909–
Evaporation from Lake Eleanor near Sequoia, Calif., 1915–
Jawbone Creek near Tuolumne, Calif., 1910–1915.
Corral Creek near Groveland, Calif., 1910–1913.
South Fork of Tuolumne River near Sequoia, Calif., 1914–1918.
South Fork of Tuolumne River near Buck Meadows [Groveland], Calif., 1910–
Middle Fork of Tuolumne River near Buck Meadows, Calif., 1916–
Golden Rock ditch near Sequoia, Calif., 1914–15.
Clavey River near Tuolumne, Calif., 1910–1913.
Indian Creek near Tuolumne, Calif., 1910–11.
North Fork of Tuolumne River near Tuolumne, Calif., 1910–11.
Hunter Creek near Tuolumne, Calif., 1910–1913.
La Grange [Yosemite] [Sierra and San Francisco] Water & Power Co.'s canal near La Grange, Calif., 1908–
Modesto canal near La Grange, Calif., 1903–
Turlock canal near La Grange, Calif., 1899–
Stanislaus River, Middle Fork, at Sand Bar Flat, near Avery, Calif., 1905–
Stanislaus River near Knights Ferry, Calif., 1915–
Stanislaus River at Knights Ferry, Calif., 1903–1916.
Stanislaus River at Oakdale, Calif., 1878–1884; 1895–1900.
Relief reservoir near Baker Station, Calif., 1910–
Relief Creek near Baker Station, Calif., 1910–
North Fork of Stanislaus River near Avery, Calif., 1914–
Utica Gold Mining Co.'s canal near Avery, Calif., 1914–
Rose Creek near Jupiter, Calif., 1910–1913.
Knight Creek near Jupiter, Calif., 1910–1913.

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San Joaquin River tributaries—Continued.
Stanislaus River tributaries—Continued.
South Fork of Stanislaus River at Strawberry, Calif., 1911–1917.
South Fork of Stanislaus River near Columbia, Calif., 1910–1913.
South San Joaquin canal near Knights Ferry, Calif., 1913–
Oakdale canal near Knights Ferry, Calif., 1913–
Stanislaus & San Joaquin Water Co.'s canal at Knights Ferry, Calif., 1904–1913.
Calaveras River at Jenny Lind, Calif., 1907–
Calaveras River near Bellota, Calif., 1878–1884.
Mokelumne River, North Fork, near West Point, Calif., 1917–
Mokelumne River at Electra, Calif., 1901; 1903–4.
Mokelumne River at Lone Star Mill, Calif., 1878–1884.
Mokelumne River near Clements, Calif., 1904–
Mokelumne River at Lodi, Calif., 1891–1895.
Middle Fork of Mokelumne River at West Point, Calif., 1911–
South Fork of Mokelumne River near Railroad Flat, Calif., 1911–
Licking Fork of Mokelumne River near Railroad Flat, Calif., 1911–1917.
Dry Creek near Ione, Calif., 1911–12.
Dry Creek at base of foothills, San Joaquin County, Calif., 1878–1884.
Cosumnes River, North Fork, near Pleasant Valley, Calif., 1906–7.
Cosumnes River, North Fork, near Eldorado, Calif., 1911–
Cosumnes River at Michigan Bar, Calif., 1907–
Cosumnes River below Michigan Bar, Calif., 1878–1884.
Sly Park Creek at Park, Calif., 1906.

GOOSE LAKE BASIN.

Drews Creek reservoir near Lakeview, Oreg., 1913–
Drews Creek near Lakeview, Oreg., 1909–
Dog Creek near Lakeview, Oreg., 1912–13.
North Drews canal near Lakeview, Oreg., 1914–
Cottonwood Creek near Lakeview, Oreg., 1908–
Thomas Creek near Lakeview, Oreg., 1912–1917.

SACRAMENTO RIVER BASIN.

Sacramento River at Castella, Calif., 1910–1918.
Sacramento River at Antler, Calif., 1910–11.
Sacramento River at Jellys Ferry, Calif., 1895–1902.
Sacramento River near Red Bluff, Calif., 1902–
Sacramento River at Red Bluff, Calif., 1894–1896.
Sacramento River at Collinsville, Calif., 1878–1885.
Pit River near Canby, Calif., 1904–5.
Pit River near Bieber, Calif., 1904–1908; 1913–14.
Pit River at Henderson, Calif., 1910–
Pit River near Ydalpom, Calif., 1910–
South Fork of Pit River near Ivy, Calif., 1904–5.
West Valley Creek near Likely, Calif., 1904–5.
Pine Creek near Alturas, Calif., 1918–
Ash Creek at Adin, Calif., 1904–5.
Fall River at Fall River Mills, Calif., 1912–13.
Hat Creek at Hawkin's ranch, near Hat Creek, Calif., 1911–1913.

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Sacramento River tributaries—Continued.
Pit River tributaries—Continued.
Hat Creek at Hat Creek, Calif., 1910–1917.
Rising River near Cassel, Calif., 1911–1914.
Burney Creek near Burney, Calif., 1911–1913.
Kosk Creek near Henderson, Calif., 1910–1916.
Montgomery Creek at Montgomery Creek, Calif., 1911–1913.
Squaw Creek near Ydalpom, Calif., 1911–1913.
McCloud River near Gregory, Calif., 1902–1908.
McCloud River at Baird, Calif., 1910–
Clear Creek near Shasta, Calif., 1911–1913.
Cow Creek, at Millville, Calif., 1911–1914.
Clover Creek at Millville, Calif., 1911–1914.
Little Cow Creek at Palo Cedro, Calif., 1911–1914.
Bear Creek near Millville, Calif., 1911–1914.
North Fork of Cottonwood Creek at Ono, Calif., 1907–1914.
Mill Creek near Los Molinos, Calif., 1909–1913.
Deer Creek near Nina, Calif., 1911–1915.
Stony Creek near Stonyford, Calif., 1913–1914.
Stony Creek near Fruto, Calif., 1901–1912.
Little Stony Creek near Lodoga, Calif., 1907–
Feather River, North Fork, above Prattville, Calif., 1905–1907.
Feather River, North Fork, near Prattville, Calif., 1905–
Feather River, North Fork, at Big Bar, Calif., 1911–
Feather River, North Fork, at Big Bend, Calif., 1905–1910.
Feather River at Oroville, Calif., 1902–
Hamilton Branch near Prattville, Calif., 1905–1907.
Butt Creek at Butte Valley, Calif., 1905–
Indian Creek near Crescent Mills, Calif., 1906–1909; 1911–1918.
Spanish Creek at Keddie, Calif., 1911–
Middle Fork of Feather River at Sloat [near Cromberg], Calif., 1910–
Middle Fork of Feather River near Oroville, Calif., 1911–
Grizzly Creek near Beckwith, Calif., 1905–6.
South Fork of Feather River at Enterprise, Calif., 1911–
Palermo Land & Water Co.'s canal at Enterprise, Calif., 1911–
Yuba River, Middle Fork, near North Juan, Calif., 1900; 1910–
Yuba River at Smartsville, Calif., 1903–
Yuba River at Parks Bar bridge, near Smartsville, Calif., 1900.
Oregon Creek near North San Juan, Calif., 1910–
North Fork of Yuba River near Sierra City, Calif., 1911–1913.
North Fork of Yuba River at Goodyear Bar, Calif., 1910–
North Fork of Yuba River near North San Juan, Calif., 1900.
North Fork of North Fork of Yuba River at Downieville, Calif., 1910–
Rock Creek at Goodyear Bar, Calif., 1910–
Goodyear Creek at Goodyear Bar, Calif., 1910–
Bear River near Colfax, Calif., 1911–1917.
Bear River at Van Trent, Calif., 1904–
Bear River canal near Colfax, Calif., 1912–
American River, North Fork, near Colfax, Calif., 1911–
American River at Fairoaks, Calif., 1904–
Middle Fork of American River near East Auburn, Calif., 1911–
Rubicon River at Rubicon Springs, Calif., 1910–1914.

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Stony Creek tributaries—Continued.
American River tributaries—Continued.
Middle Fork of American River tributaries—Continued.
Rubicon River near Quintette, Calif., 1909–1914.
Little Rubicon River near Rubicon Springs, Calif., 1910–11.
Little South Fork of Rubicon River at sawmill near Quintette, Calif., 1910–1914.
Little South Fork of Rubicon River below Gerle Creek near Quintette, Calif., 1910–1914.
Little South Fork of Rubicon River at mouth, near Quintette, Calif., 1909–1911.
Gerle Creek near Rubicon Springs, Calif., 1910–1914.
Little South Fork ditch at sawmill near Quintette, Calif., 1910–1913.
Pilot Creek near Quintette, Calif., 1910–1914.
Pilot Creek ditch near Quintette, Calif., 1910–1914.
South Fork of American River at Kyburz, Calif., 1906–7.
South Fork of American River near Kyburz, Calif., 1906.
South Fork of American River below Kyburz, Calif., 1907.
South Fork of American River near Placerville, Calif., 1911–
Clear Lake at Lakeport, Calif., 1874–1900; 1913–
Cache Creek at Lower Lake, Calif., 1901–1915.
Cache Creek at Yolo, Calif., 1903–
Putah Creek near Guenoc, Calif., 1904–1906.
Putah Creek at Winters, Calif., 1905–

DRAINAGE BASINS NORTH OF SAN FRANCISCO BAY.

RUSSIAN RIVER BASIN.

Russian River near Ukiah, Calif., 1911–1913.
Russian River at Geyserville, Calif., 1910–1913.
East Fork of Russian River near Ukiah, Calif., 1911–1913.

MATTOLE RIVER BASIN.

Mattole River near Petrolia, Calif., 1911–1913.

EEL RIVER BASIN.

South Eel River at Hearst, Calif., 1910–1913.
Eel River at Two Rivers, Calif., 1911–1913.
Eel River at Scotia, Calif., 1910–1915; 1916–
Middle Eel River near Covelo, Calif., 1911–
South Fork of Eel River at Garberville, Calif., 1911–1913.
Van Duzen River at Bridgeville, Calif., 1911–1913.
Yager Creek at Carlotta, Calif., 1911–1914.

MAD RIVER BASIN.

Mad River near Arcata, Calif., 1910–1913.

REDWOOD CREEK BASIN.

Redwood Creek near Korbel, Calif., 1911–1913.
Redwood Creek at Orick, Calif., 1911–1913.

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KLAMATH RIVER BASIN.

Williamson River near Silver Lake, Oreg., 1917–
Williamson River (head of Klamath River) above Spring Creek, near Klamath Agency [Chiloquin], Oreg., 1908–1910; 1912–13; 1917–
Williamson River at Chiloquin, Oreg., 1911–1917.
Williamson River below Sprague River near Chiloquin, Oreg., 1917–
Upper Klamath Lake near Klamath Falls, Oreg., 1904; 1906–
Link River at Klamath Falls, Oreg., 1904–
Klamath River below Klamath Falls, Oreg., 1907–1909.
Klamath River at Keno, Oreg., 1904–1913.
Klamath River at Spencer Bridge, near Keno, Oreg., 1913–
Klamath River near Seiad Valley, Calif., 1912–
Klamath River near Happy Camp, Calif., 1911–12.
Klamath River near Requa, Calif., 1910–
- Miller Creek near Crescent, Oreg., 1911–1914.
- Scott Creek near Fort Klamath, Oreg., 1917–18.
- Sand Creek near Fort Klamath, Oreg., 1917–
- Sprague River, North Fork, near Bly, Oreg., 1917–18.
- Sprague River near Beatty [above Yainax], Oreg., 1912–
- Sprague River near (below) Yainax, Oreg., 1904.
- Sprague River at Chiloquin, Oreg., 1911–
- Sprague River Irrigation Co.'s canal near Bly, Oreg., 1918–
  - Fivemile Creek near Bly, Oreg., 1917–
  - Sycan River near Silverlake, Oreg., 1905–6; 1918–
  - Sycan River near Beatty [Yainax], Oreg., 1911–
  - Long Creek near Silver Lake, Oreg., 1918–
  - Whiskey Creek near Beatty, Oreg., 1917–
  - Modoc Point canal neat Chiloquin, Oreg., 1915–
- Wood River at Fort Klamath, Oreg., 1911–
  - Anna Creek at Crater Lake post office, Oreg., 1913.
- Fourmile Creek near Odessa, Oreg., 1912–1917.
- "A" canal at Klamath Falls, Oreg., 1911–
- Lost River near Clear Lake, Calif., 1904–1909.
- Lost River above Olene, Oreg., 1915–1917.
- Lost River at Olene, Oreg., 1904; 1907–1912.
- Lost River at Wilson Bridge near Olene, Oreg., 1912–
- Lost River at Merrill, Oreg., 1916.
- Lost River near Merrill, Oreg., 1904–1909.
  - Tule Lake near Merrill, Oreg., 1904–
  - Miller Creek near Lorella, Oreg., 1909–
  - Olene Wasteway at Olene, Oreg., 1915–
  - Lost River diversion canal near Klamath Falls, Oreg., 1912–
  - G canal [4] at Lost River dam near Olene, Oreg., 1912–
- Lower Klamath Lake near Mount Dome [Brownell], Calif., 1907–1909; 1912–1918.
- Beaver Creek near Lilyglen, Oreg., 1916–
- Keene Creek near Ashland, Oreg., 1916–
- Shasta River near Montague, Calif., 1911–1913; 1916–
- Scott River, East Fork, near Callahan, Calif., 1910–1913.
- Scott River, East Fork, at Callahan, Calif., 1913–
- Scott River at Callahan, Calif., 1911–
- Scott River near Scott Bar, Calif., 1911–1913.

[4] Formerly called Griffith lateral.

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Klamath River tributaries—Continued.

Indian Creek near Happy Camp, Calif., 1911–

Reeve Davis flume near Happy Home, Calif., 1911–1913.

Salmon River at Somesbar, Calif., 1911–1915.

Trinity River near Trinity Center, Calif., 1910–1913.

Trinity River at Lewiston, Calif., 1911–

Trinity River near China Flat, Calif., 1911–1913.

Trinity River at Hoopa, Calif., 1911–1914; 1916–1918.

Coffee Creek at Coffee, Calif., 1910–1914.

East Fork of Trinity River near Trinity Center, Calif., 1910–1914.

Swift Creek near Trinity Center, Calif., 1910–1914.

North Fork of Trinity River at Helena, Calif., 1911–1914.

South Fork of Trinity River near China Flat, Calif., 1911–1913.

SMITH RIVER BASIN.

Smith River, Middle Fork, near Crescent City, Calif., 1911–

North Fork of Smith River near Crescent City, Calif., 1911–

South Fork of Smith River near Crescent City, Calif., 1911–1913.

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REPORTS ON WATER RESOURCES OF PACIFIC SLOPE BASINS OF CALIFORNIA.

PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

WATER-SUPPLY PAPERS.

Water-Supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased (at price noted) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Omission of the price indicates that the report is not obtainable from Government sources. Water-supply papers are of octavo size.

*17. Irrigation near Bakersfield, Calif., by C. E. Grunsky. 1898. 96 pp., 16 pls.

*18. Irrigation near Fresno, Calif., by C. E. Grunsky. 1988. 94 pp., 14 pls.

*19. Irrigation near Merced, Calif., by C. E. Grunsky. 1899. 59 pp., 11 pls.

Water-supply Papers 17, 18, and 19 discuss the development of irrigation in the San Joaquin Valley, outline physiographic features, and give history of the various irrigation districts. Chiefly of historic interest as indicated by dates of publication.

*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls. 15c.

Describes the location and construction of various types of canals for irrigation.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp. 11 pls. 15c.

Gives elevations and distances along Sacramento, Pit, Feather, Yuba, American, Cosummes, Mokelumne, Calaveras, Toulumne, and Klamath rivers, California.

*45. Water storage on Cache Creek, Calif., by A. E. Chandler. 1901. 48 pp., 10 pls. 15c.

Discusses topography, precipitation, stream measurements, ground waters, and irrigation works in Cache Creek basin; includes description of Clear Lake.

46. Physical characteristics of Kern River, Calif., by F. H. Olmsted, and Reconnaissance of Yuba River, Calif., by Marsden Manson. 1901. 57 pp., 8 pls. 10c.

Describes topography of Kern River basin, gives estimates of daily and monthly discharge and discusses possible utilization of storage sites and development of power. The second paper in the report gives similar data for Yuba River.

*57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. (See No. 149.) 5c.

Contains information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" gives information concerning temperature, quality of water, purposes of boring, etc.

*58. Storage of water on Kings River, Calif., by J. B. Lippincott. 1902. 101 pp., 32 pls. 15c.

Discusses physical features, rainfall, stream flow, evaporation and seepage, and power development; includes chapter (by Lewis A. Hicks) on the generation and transmission of electric power and installation of pumping plants.

*59. Development and application of water near San Bernardino, Colton, and Riverside, Calif., Part I, by J. B. Lippincott. 1902. 95 pp., 11 pls.

*60. Development and application of water near San Bernardino, Colton, and Riverside, Calif., Part II, by J. B. Lippincott. 1902. 45 pp. (97–141), 15c.

Nos. 59 and 60 describe topography, soil, climate, crops, canals, wells, and pumping plants; discuss briefly the manufacture of Portland cement in southern California.

*81. California hydrography, by J. B. Lippincott. 1903. 488 pp., 1 pl. 25c.

A collection of published records of stream flow "hitherto much scattered, some of them out of print and difficult to secure," brought together as a book of reference for engineers and irrigators.

86. Storage reservoirs on Stony Creek, Calif., by Burt Cole. 1903. 62 pp., 16 pls. 15c.

Discusses briefly water supply of Glenn County as related to population and industry, irrigation districts, the proposed Stony Creek forest reserve, and storage sites on Grindstone, Salt, Briscoe, and Stony creeks.

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89. Water resources of the Salinas Valley, Calif., by Homer Hamlin. 1904. 91 pp., 12 pls. 15c.

Describes briefly the geography, topography, general and economic geology, climate, water supply, and irrigation of the Salinas Valley.

*103. A review of the laws forbidding pollution of inland waters in the United States by E. B. Goodell. 1904. 120 pp. Superseded by 152.

Cites statutory restriction of water pollution in California.

*112. Underflow tests in the drainage basin of Los Angeles River, by Homer Hamlin. 1905. 55 pp., 7 pls. 5c.

Discusses conditions under which ground water occurs in arid regions, and fluctuations in water level; describes machinery and methods used in sinking test wells and the results obtained at each station.

116. Water problems of Santa Barbara, Calif., by J. B. Lippincott. 1905. 99 pp., 8 pls. 10c.

Reviews earlier work in Santa Barbara region and describes near-by and distant water supplies, including Ventura and Santa Ynez rivers; discusses the quality of the water of the Santa Ynez (giving analyses) and the available reservoir sites.

*122. Relation of the law to underground waters, by D. W. Johnson. 105. 55 pp. 5c.

Cites legislative acts relating to ground waters in California.

*137. Development of underground waters in the eastern coastal-plain region of southern California, by W. C. Mendenhall. 1905. 140 pp., 7 pls. 35c.

*138. Development of underground waters in the central coastal-plain region of southern California, by W. C. Mendenhall. 1905. 162 pp., 5 pls. 25c.

*139. Development of underground waters in the western coastal-plain region of southern California, by W. C. Mendenhall. 1905. 105 pp., 8 pls. 25c.

Three reports discussing the topography, crops, irrigation systems, and wells, and the effects of development and drought on changes in ground-water level. The area covered by these reports includes the Anaheim, Santa Ana, Downey, Las Bolsas, Santa Monica, and Redondo quadrangles in Orange and Los Angeles counties.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.

Contains chapters on measurements of underflow of Rio Hondo, San Gabriel, and Mohave rivers.

*142. The hydrology of San Bernardino Valley, Calif., by W. C. Mendenhall. 1905. 124 pp., 12 pls. 25c.

Discusses rainfall, soils, artesian areas, temperature, and chemical character of the ground waters, gives tables of flow of Santa Ana River, Mill Creek, and other streams, and lists of wells in Redlands and San Bernardino quadrangles.

146. Proceedings of second conference of engineers of the Reclamation Service; with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15c. [Inquiries concerning this report should be addressed to the Reclamation Service.] Contains:

A report on "Underground waters of southern California," by W. C. Mendenhall. Gives an account of early irrigation by use of surface waters, the development of artesian wells for irrigation, and discusses the origin, distribution, and character of the artesian waters, the causes of fluctuations in the supply, and the need of moderation in use.

A report on the Klamath project, by J. B. Lippincott. Describes Klamath River and its principal tributaries and Lost River and Tule Lake. Describes also the irrigable lands in Butte Valley and around Tule and Lower Klamath lakes and in the Klamath Indian Reservation.

A brief report on "Pumping underground water in southern California," by F. C. Finkle. Discusses underground reservoirs, the source, extent, and methods of replenishment of the water supply, and describes the efficiency of pumps and the development of electric power for pumping.

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147. Destructive floods in the United States in 1904, by E. C. Murphy and others. 1905. 206 pp., 18 pls. 15c. Contains:

Sacramento River flood, California, from report of S. G. Bennett. Gives accounts of flood on Sacramento River; describes briefly the streams of the basin, precipitation, discharge, damages, and prevention of future losses.

*149. Preliminary list of deep borings in the United States, second edition, with additions, by N. H. Darton. 1905. 175 pp. 10c.

Gives, by States (and within the States by counties), location, depth, diameter, yield, height of water, and other information concerning wells 400 feet or more in depth; includes all wells listed in Water-Supply Papers 57 and 61; mentions also principal publications relating to deep borings.

*152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

Cites statutory restrictions of water pollution in California.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

Gives estimates of flood flow and frequency (p. 85) for Tuolumne River at La Grange, Kern River at Rio Bravo ranch, and Kings River at Sanger.

*213. The surface water supply of California, 1906, by W. B. Clapp, with a section on ground-water levels in southern California, by W. C. Mendenhall. 1907. 219 pp., 4 pls. 25c.

Contains the results of a series of measurement of the fluctuation of ground-water levels made during 1904, 1905, and 1906. The wells were "so selected that they would be evenly distributed over the various basins which together make up the lowland areas of southern California, and would thus give an adequate basis for conclusions as to conditions in each of these basins."

*219. Ground waters and irrigation enterprises in the foothill belt, southern California, by W. C. Mendenhall. 1908. 180 pp., 9 pls. 50c.

Describes the general geologic conditions, physical features, rainfall, storage facilities, character and condition of subterranean reservoirs, measures for conservation of waters, and the ground waters by districts; discusses fluctuation in ground-water levels and gives results of measurements; describes irrigation enterprises and systems and gives statistics of wells.

*220. Geology and water resources of a portion of south-central Oregon, by G. A. Waring. 1908. 86 pp., 10 pls. 20c.

Describes the rocks, streams, lakes, and lake valleys, deep and shallow wells, climate, soils, vegetation, industries, and reclamation projects in Lake County; gives analyses of soils and waters. The greater part of the area described is considered part of the Great Basin, but the streams of a small area in the southern part are tributary to Goose Lake, which within historic times has overflowed southward to Pit River, a tributary of the Sacramento.

*222. Preliminary report on the ground waters of San Joaquin Valley, Calif., by W. C. Mendenhall. 1908. 52 pp., 1 pl. 10c.

Describes the geography of the valley, the rocks, soils, surface waters, and the origin, circulation, quantity, accessibility, and development of the ground waters; gives notes on water supply by counties.

237. The quality of the surface waters of California, by Walton Van Winkle and F. M. Eaton. 1910. 142 pp., 1 pl. 20c.

Describes geography, climate, industrial development, and drainage, and gives results of mineral analyses of the river waters.

251. Surface-water supply of the United States, 1907–8, Part XI. California, by W. B. Clapp and W. F. Martin. 1910. 363 pp., 7 pls. 35c.

Contains a section (pp. 338–348) on "fluctuations in ground-water levels in the valley of southern California." The measurements here published form a continuation of those published in Water-Supply Paper 213. They were made at irregular intervals during 1907–8 on the same wells that were measured during the earlier period, except for a few wells that had become inaccessible.

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274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describe collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of Sacramento, Pit, Feather, Yuba, and American rivers, Stony and Putah creeks, and Tuolumne River; also of Link River, Oreg., in Klamath River basin.

295. Gazetteer of surface waters of California, Part I, Sacramento River basin, by B. D. Wood. 1912. 99 pp. 10c.

296. Gazetteer of surface waters of California, Part II, San Joaquin River basin, by B. D. Wood. 1912. 102 pp. 10c.

297. Gazetteer of surface waters of California, Part III, Pacific Coast and Great Basin streams, by B. D. Wood. 1913. 244 pp. 20c.

Nos. 295-297 embrace descriptions of streams and lakes named on best available maps of California.

*298. Water resources of California, Part I, Stream measurements in Sacramento River basin, by H. D. McGlashan and F. F. Henshaw. 1912. 411 pp., 8 pls. 30c.

*299. Water resources of California, Part II, Stream measurements in San Joaquin River basin, by H. D. McGlashan and H. J. Dean. 1912. 439 pp., 7 pls. 35c.

300. Water resources of California, Part III, Stream measurements in the Great Basin and Pacific coast river basins, by H. D. McGlashan and H. J. Dean. 1913. 956 pp., 4 pls. 55c.

Nos. 298-300 comprise all data concerning stream flow in California available up to September 30, 1912. The reports describe the drainage basins, precipitation, temperature, and forests, and give the results of work at gaging stations. See also Nos 295-297.

338. Springs of California, by Gerald A. Waring. 1915. 410 pp., 13 pls. 60c.

Describes briefly the physical features of California, including the coast ranges, Great Central Valley, the lava-covered region, the Sierra Nevada, the southeastern desert, and faults; defines "mineral water" and "pure water"; discusses source and amount of substances in waters; degree of concentration of natural waters and their properties, and the therapeutic value, temperature, and classification of mineral waters. The springs are described under the headings "hot," "carbonated," "sulphur," "saline," "magnesic," "iron," "artesian," "large cold," and "minor perennial" springs.

345. Contributions to the hydrology of the United States, 1914; N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

(k) Ground-water resources of the Niles cone and adjacent areas, California, by W. O. Clark. Describes an area just east of the south end of San Francisco Bay. The investigation on which the report is based was made "to determine the source of the ground water, the quantity now being withdrawn, the amount available, and the area dependent on Alameda Creek." Describes the physiography and drainage of mountain and valley areas; gives records of precipitations in Alameda and Santa Clara counties and of the monthly discharge of Alameda Creek; discusses the source of the ground waters, the effect of the Niles-Irvington fault, contributions to the ground-water supply, relation of withdrawals to contributions, and gives a summary of conclusions.

363. Quality of the surface waters of Oregon, by Walton Van Winkle. 1914. 137 pp., 2 pls. 20c.

Among the drainage basins described is Goose Lake, which has within historic times discharged southward to Pit River, a tributary of the Sacramento, and Klamath River, which enters the Pacific in northern California.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of water from Matilija Hot Springs, Calif., and of mine waters from Nevada City and Sulphur Bank [near Clear Lake], Calif.

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375. Contributions to the hydrology of the United States, 1915; Nathan C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. 15c. Contains:

(a) Ground water for irrigation in the Sacramento Valley, Calif., by Kirk Bryan. Describes the geography and the geology of the valley and the origin and the movements of the ground water, and discusses problems relating to wells and to pumping; gives a brief account of the progress of irrigation with well water.

398. Ground water in San Joaquin Valley, Calif., by W. C. Mendenhall, R. B. Dole, and Herman Stabler. 1916. 310 pp., 5 pls. 25c.

Describes the geography of the valley and gives the geologic outline of the rocks of the border and the origin of the present surface; describes the occurrence and utilization of ground water, the chemical composition of surface and ground waters, and gives notes by counties. Contains 62 tables, most of which relate to the qualities of the waters.

*400. Contributions to the hydrology of the United States, 1916; Nathan C. Grover, chief hydraulic engineer. 108 pp., 7 pls. Contains:

(c) Ground water for irrigation in the Morgan Hill area, Calif., by W. O. Clark.

426. Southern California floods of January, 1916, by H. D. McGlashan and F. C. Ebert. 1918. 81 pp., 17 pls. 15c.

Compares the flood of January, 1916, with previous floods, summarizes the damages, and gives flood-flow records.

429. Ground water in the San Jacinto and Temecula basins, Calif., by G. A. Waring. 1919. 113 pp., 14 pls.

*446. Geology and ground waters of the western part of San Diego County, Calif., by A. J. Ellis and C. H. Lee. 1919. 321 pp., 47 pls.

450. Contributions to the hydrology of the United States, 1919; N. C. Grover, chief hydraulic engineer.

(b) Ground water in Lanfair Valley, Calif., by D. G. Thompson. pp. 29-50, pls. v-vi.

(c) Ground water in Pahrump, Mesquite, and Ivanpah valleys, Nev. and Calif., by G. A. Waring. pp. 51-86, pls. vii-xi.

490. Routes to desert watering places in California and Arizona.

*(a) Routes to desert watering places in the Salton Sea region, Calif., by J. S. Brown. pp. 1-86, pls. i-vii.

ANNUAL REPORTS.

Each of the papers contained in the annual reports was also issued in separate form.

Annual reports are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*Tenth Annual Report of the United States Geological Survey, 1888-89, J. W. Powell, Director. 1890. 2 parts. *Pt. II, Irrigation, viii, 123 pp. 35c.

Makes a preliminary report on the organization and prosecution of the survey of the arid lands for purposes of irrigation; includes an account of the methods of topographic and hydraulic work, the segregation work on reservoir sites and irrigable lands, field and office methods, and brief descriptions of the topography of some of the river basins.

Eleventh Annual Report of the United States Geological Survey, 1889-90, J. W Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xiv, 395 pp., 30 pls. (67-96) and maps. $1.25. Contains:

*Hydrography, pp. 1-110. Discusses scope of work, methods of stream measurement, rainfall, and evaporation, and describes the more important streams.

*Engineering, pp. 111-200. Defines the scope of the work and gives an account of the surveys in the Sun River basin and in the Arkansas, Rio Grande, California, Lahontan, Utah, and Snake River divisions.

*The arid lands, pp. 201-289. Includes statement of the Director to the House Committee on Irrigation and extracts from the constitutions of States relating to irrigation.

*Topography, pp. 291-343. Comprises reports of the topographic surveys in California, Nevada, Colorado, Idaho, Montana, and New Mexico, and a report on reservoir sites.

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*Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. *Pt. II, Irrigation, xviii, 576 pp., 93 pls. (54–146.) $2. Contains:

*Report upon the location and survey of reservoir sites during the fiscal year ended June 30, 1891, by A. H. Thompson, pp. 1–212, pls. 54–57. Describes reservoir sites in California; for each reservoir site gives the location, height of dam, area inclosed by top contour, approximate contents of reservoir, position of irrigable lands, and areas of segregated lands.

*Hydrography of the arid regions, by F. H. Newell, pp. 213–361, pls. 58–106. Discusses the available water supply of the arid regions, the duty of water, flood waters, relation of rainfall to river flow; classifies the drainage basins; and describes the rivers of the Missouri, Arkansas, Rio Grande, Colorado, Sacramento, and San Joaquin basins, and the principal streams of the Great Basin in Nevada and Utah and the Snake River drainage.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. (108–184.) $1.85. Contains:

*Engineering results of irrigation survey, by H. M. Wilson, pp. 351–427, pls. 147–182. Describes results of surveys of High Sierra reservoirs—Bear Valley, Kennedys Meadow, Kennedys Lake, Lake Eleanor, Tuolumne Meadows, Lake Tenaya, and Little Yosemite—and of Clear Lake, Calif.

Sixteenth Annual Report of the United States Geological Survey, 1894–95, Charles D. Walcott, Director. 1896. (Pts. II, III, and IV, 1895.) 4 parts. *Pt. II. Papers of an economic character, xix, 598 pp., 42 pls. $1.25. Contains:

The public lands and their water supply, by F. H. Newell, pp. 457–533, pls. 35–39. Describes general character of the public lands, the lands disposed of (railroad, grant and swamp lands, and private and miscellaneous entries), lands reserved (Indian, forest, and military reservations), the vacant lands, and the rate of disposal of vacant lands; discusses the streams, wells, and reservoirs as sources of water supply; gives details for each State.

Eighteenth Annual Report, United States Geological Survey, 1896–97, Charles D. Walcott, Director. 1897. 5 parts in 6 volumes. *Pt. IV, Hydrography, x, 756 pp., 102 pls. $1.75. Contains:

*Reservoirs for irrigation, by J. D. Schuyler, pp. 617–740, pls. 48–102. Describes rock-fill, masonry, and earthen dams, and hydraulic dam construction in California, and projected reservoirs; gives tables of reservoir capacities and areas.

Twentieth Annual Report of the United States Geological Survey, 1898–99, Charles D. Walcott, Director. 1899. (Parts II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. V, Forest Reserves, xix, 498 pp., 159 pls., 8 maps in separate case. $2.80. Contains:

*The San Gabriel Forest Reserve, by J. B. Leiberg, pp. 411–428, pls. 143–146. The San Bernardino Forest Reserve, by J. B. Leiberg, pp. 429–454, pls. 147–153. The San Jacinto Forest Reserve, by J. B. Leiberg, pp. 455–478, pls. 154–159. Describes general topographic features of forest reserves and drainage, part of which is by streams tributary to the Pacific and part by streams that are lost in the sands of the Mohave and other deserts.

PROFESSIONAL PAPER.

Professional papers are distributed free by the Geological Survey as long as the stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked with an asterisk may, however, be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Professional papers are of quarto size.

105. Hydraulic-mining débris in the Sierra Nevada, by G. K. Gilbert. 154 pp.; 34 pls. 1917. 50 c.

Presents the results of an investigation undertaken by the United States Geological Survey in response to a memorial from the California Miners' Association asking that a particular study be made of portions of the Sacramento and San Joaquin valleys affected by detritus from torrential streams. The report deals largely with geologic and physiographic aspects of the subjects, traces the physical effects, past and future, of the hydraulic mining of earlier decades, the similar effects which certain other industries induce through stimulation of the erosion of the soil, and the influence of the restriction of the area of inundation by the construction of levees. Suggests cooperation by several interests for the control of the streams now carrying heavy loads of débris.

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BULLETINS.

An asterisk (*) indicates that the Geological Survey's stock of the paper is exhausted. Many of the papers so marked may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

Discusses the importance of accurate well records to the driller, to owners of oil, gas, and water wells, and to the geologist; describes the general methods of work; gives tabulated records of wells in California, and detailed records of wells in Monterey and San Diego counties, California. These wells were selected because they give definite stratigraphic information.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in California; and detailed records of wells in Alameda, Fresno, Kern, Orange, San Luis Obispo, Santa Clara, Tulare, and Ventura counties. The wells of which detailed sections are given were selected because they afford valuable stratigraphic information.

GEOLOGIC FOLIOS.

Under the plan adopted for the preparation of a geologic map of the United States the entire area is divided into small quadrangles, bounded by certain meridians and parallels, and these quadrangles, which number several thousand, are separately surveyed and mapped.[5] The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute the Geologic Atlas of the United States. A folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. Each folio includes maps showing the topography, geology, underground structure, and mineral deposits of the area mapped and several pages of descriptive text. The text explains the maps and describes the topographic and geologic features of the country and its mineral products. The topographic map shows roads, railroads, waterways, and, by contour lines, the shapes of the hills and valleys and the height above sea level of all points in the quadrangle. The areal-geology map shows the distribution of the various rocks at the surfaces. The structural-geology map shows the relations of the rocks to one another underground. The economic-geology map indicates the location of mineral deposits that are commercially valuable. The artesian-water map shows the depth to ground-water horizons. Economic-geology and artesian-water maps are included in folios, if the conditions in the areas mapped warrant their publication. The folios are of special interest to students of geography and geology and are valuable as guides in the development and utilization on mineral resources.

The folios numbered from 1 to 163, inclusive, are published in only one form (18 by 22 inches), called the library edition. Some of the folios that bear numbers higher than 163 are published also in an octavo edition (6 by 9 inches). Owing to a fire in the Geological Survey Building May 18, 1913, the stock geologic folios was more or less damaged by fire and water, but many are usable, and will be sold at the uniform price of 5 cents each, with no reduction for wholesale orders. This rate applies to folios in stock from 1 to 184, inclusive; also to the library edition of folio 186. The library edition of folios 185, 187, and higher numbers sell for 25 cents a copy, except that some folios which contain an unusually large amount of matter sell for 50 cents a copy. The octavo edition of folio 185 and higher numbers sells for 50 cents a copy. If 34 folios selling at 25 cents each (or their equivalent in higher-priced folios) are ordered at one time a discount of 40 per cent is allowed; $5.10 is the minimum amount this rate.

s showing areas in California covered by topographic maps and by geologic folios will be pt of request addressed to the Director, U. S. Geological Survey, Washington, D. C.

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All the folios contain descriptions of the drainage of the quadrangles. The folios in the following list contain also brief discussions of the underground waters in connection with the economic resources of the areas and more or less information concerning the utilization of the water resources.

An asterisk (*) indicates that the stock of the folio is exhausted.

*17. Marysville folio.
*39. Truckee folio.
*66. Colfax folio.
*101. San Luis folio.
*138. Redding folio.
*163. Santa Cruz folio.
193. San Francisco folio. 75c. in either edition.

MISCELLANEOUS REPORTS.

Other Federal bureaus and State and other organizations have from time to time published reports relating to the water resources of various sections of the country. Notable among those pertaining to the Pacific slope of California are the reports of the Chief of Engineers, U. S. Army, the State engineer and surveyor, the State conservation commission and the State water commission.

The following reports deserve special mention:

Hall, W. H., Physical data and statistics of California, 1886.

Report of the Commissioner of Public Works to the Governor of California, 1895.

Report of the State Water Commission of California, 1912.

Subterranean storage of flood waters by artificial methods in San Bernardino Valley, Calif., by C. H. Lee. Conservation Commission of California Rept. for 1912, Sacramento, Calif., 1912. pp. 335–400, 3 pls.

Gives history and methods of water spreading and amount of water spread along Santa Ana River and other streams. Gives data in regard to precipitaion, run-off, and stream percolation in the San Bernardino Basin. Describes the ground-water reservoir in this basin, giving data on fluctuations of the water table and the artesian head. Discusses ground-water fluctuations in other basins in southern California and draws conclusions as to the effect of water spreading. Includes a map showing the original area of artesian flow in the San Bernardino Basin and the areas in 1904 and 1912; also locations of wells and of lands used for spreading water.

Ground-water resources of Indian Wells Valley, Calif., by C. H. Lee. Conservation Commission of California Rept. for 1912, Sacramento, Calif., 1912. pp. 1–40, 429, 5 pls.

A brief report covering the arid valley (also known as Salt Wells Valley) that lies mostly in northeastern Kern County but extends into Inyo and San Bernardino counties and comprises a part of the area included in Tps. 25–27, Rs. 38–40. Gives information in regard to precipitation, stream flow, evaporation of ground water, and water supply available by pumping from wells.

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GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTEREST.

The following list comprises reports not readily classifiable by drainage basins and covering a wide range of hydrologic investigations.

WATER-SUPPLY PAPERS.

*1. Pumping water for irrigation, by H. M. Wilson. 1896. 57 pp., 9 pls.

Describes pumps and motive powers, windmills, water wheels, and various kinds of engines; also storage reservoirs to retain pumped water until needed for irrigation.

*3. Sewage irrigation, by G. W. Rafter. 1897. 100 pp., 4 pls. (See Water-Supply Paper 22.) 10c.

Discusses methods of sewage disposal by intermittent filtration and by irrigation; describes utilization of sewage in Germany, England, and France, and sewage purification in the United States.

*8. Windmills for irrigation, by E. C. Murphy. 1897. 49 pp., 8 pls. 10c.

Gives results of experimental tests of windmills during the summer of 1896 in the vicinity of Garden, Kans.; describes instruments and methods and draws conclusions.

*14. New tests of certain pumps and water lifts used in irrigation, by O. P. Hood. 1898. 91 pp., 1 pl.

Discusses efficiency of pumps and water lifts of various types.

*20. Experiments with windmills, by T. O. Perry. 1899. 97 pp., 12 pls. 15c.

Includes tables and descriptions of wind wheels, compares wheels of several types, and discusses results.

*22. Sewage irrigation, Part II, by G. W. Rafter. 1899. 100 pp., 7 pls. 15c.

Gives résumé of Water-Supply Paper No. 3; discusses pollution of certain streams, experiments on purification of factory wastes in Massachusetts, value of commercial fertilizers, and describes American sewage-disposal plants by States; contains bibliography of publications relating to sewage utilization and disposal.

*41. The windmill, its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls. 5c.

*42. The windmill, its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp. (73–147), 2 pls. (15–16). 10c.

Nos. 41 and 42 give details of results of experimental tests with windmills of various types.

*56. Methods of stream measurement. 1901. 51 pp., 12 pls. 15c.

Describes the methods used by the Survey in 1901–2. See also Nos. 64, 94, and 95.

*64. Accuracy of stream measurements, by E. C. Murphy. 1902. 99 pp., 4 pls. (See No. 95.) 10c.

Describes methods of measuring velocity of water and of measuring and computing stream flow, and compares results obtained with the different instruments and methods; describes also experiments and results at the Cornell University hydraulic laboratory. A second enlarged edition published as Water-Supply Paper 95.

*67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls. 15c.

Discusses origin, depth, and amount of ground waters, permeability of rocks and porosity of soils; causes, rates, and laws of motions of ground water; surface and deep zones of flow; and recovery of waters by open wells and artesian and deep wells; treats of the shape and position of the water table; gives simple methods of measuring yield of flowing wells; describes artesian wells at Savannah, Ga.

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72. Sewage pollution in the metropolitan area near New York City and its effect on inland water resources, by M. O. Leighton. 1902. 75 pp., 8 pls. 10c.

Defines "normal" and "polluted" waters and discusses the damage resulting from pollution.

*80. The relation of rainfall to run-off, by G. W. Rafter. 1903. 104 pp. 10c.

Treats of measurements of rainfall and laws and measurements of stream flow; gives rainfall, run-off, and evaporation formulas; discusses effect of forests on rainfall and run-off.

87. Irrigation in India (second edition), by H. M. Wilson. 1903. 238 pp., 27 pls. 25c.

First edition was published in Part II of the Twelfth Annual Report.

93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1904. 361 pp. 25c. [Requests for this report should be addressed to the U. S. Reclamation Service.]

Contains the following papers of more or less general interest:
Limits of an irrigation project, by D. W. Ross.
Relation of Federal and State laws to irrigation, by Morris Bien.
Electrical transmission of power for pumping, by H. A. Storrs.
Correct design and stability of high masonry dams, by George Y. Wisner.
Irrigation surveys and the use of the plane table, by J. B. Lippincott.
The use of alkaline waters for irrigation, by Thomas H. Means.

*94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls. 10c.

Gives instruction for field and office work relating to measurements of stream flow by current meters. See also No. 95.

*95. Accuracy of stream measurements (second, enlarged edition), by E. C. Murphy. 1904. 169 pp., 6 pls.

Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. See also No. 94.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.)

Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classified according to scope the statutes enacted in the different States.

*110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10 cts.

Contains the following reports of general interest. The scope of each paper is indicated by its title.

Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.

The California or "stovepipe" method of well construction, by Charles S. Slichter.

Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.

Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.

Experiment relating to problems of well contamination at Quitman, Ga., by S. W. McCallie.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.

The first paper discusses the pollution of streams by sewage and by trade wastes, describes the manufacture of strawboard, and gives results of various experiments in disposing of the waste. The second paper describes briefly the topography, drainage, and geology of the region about Marion, Ind., and the contamination of rock wells and of streams by waste oil and brine.

*114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.

Contains report on "Occurrence of underground waters," by M. L. Fuller, discussing sources, amount, and temperature of waters, permeability and storage capacity of rocks, water-bearing formations, recovery of water by springs, wells, and pumps, essential conditions of artesian flows, and general conditions affecting ground waters in eastern United States.

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119. Index to the hydrographic progress reports of the United States Geological Survey, 1888 to 1903, by J. C. Hoyt and B. D. Wood. 1905. 253 pp. 15c.

120. Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879–1904, by M. L. Fuller. 1905. 128 pp. 10c.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Defines and classifies underground waters, gives common-law rules relating to their use, and cities State legislative acts affecting them.

143. Experiments on steel-concrete pipes on a working scale, by J. H. Quinton. 1905. 61 pp., 4 pls. 5c.

Scope indicated by title.

145. Contributions to the hydrology of Eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls. 10c.

Contains brief reports of general interest as follows:

Drainage of ponds into drilled wells, by Robert E. Horton. Discusses efficiency, cost, and capacity of drainage wells and gives statistics of such wells in southern Michigan.

Construction of so-called fountain and geyser springs, by Myron L. Fuller.

A convenient gage for determining low artesian heads, by Myron L. Fuller.

146. Proceedings of second conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15c. [Requests for this report should be addressed to the U. S. Reclamation Service.]

Contains the following papers (scope indicated by title) of more or less general interest:

Proposed State code of water laws, by Morris Bien.

Power engineering applied to irrigation problems, by O. H. Ensign.

Estimates on tunneling in irrigation projects, by A. L. Fellows.

Collection of stream-gaging data, by N. C. Grover.

Diamond-drill methods, by G. A. Hammond.

Mean-velocity and area curves, by F. W. Hanna.

Importance of general hydrographic data concerning basins of streams gaged by R. E. Horton.

Effect of aquatic vegetation on stream flow, by R. E. Horton.

Sanitary regulations governing construction camps, by M. O. Leighton.

Necessity of draining irrigated land, by Thos. H. Means.

Alkali soils, by Thomas H. Means.

Cost of stream-gaging work, by E. C. Mruphy.

Equipment of a cable gaging station, by E. C. Murphy.

Silting of reservoirs, by W. M. Reed.

Farm-unit classification, by D. W. Ross.

Cost of power for pumping irrigating water, by H. A. Storrs.

Records of flow at current-meter gaging stations during the frozen season, by F. H. Tillinghast.

147. Destructive floods in the United States in 1904, by E. C. Murphy and others. 1905. 206 pp., 18 pls. 15c.

Contains a brief account of "A method of computing cross-section area of waterways," including formulas for maximum discharge and area of cross section.

*150. Weir experiments, coefficients, and formulas, by R. E. Horton. 1906. 189 pp., 38 pls. (See Water-Supply Paper 200.) 15c.

151. Field assay of water, by M. O. Leighton. 1905. 77 pp., 4 pls.

Discusses methods, instruments, and reagents used in determining turbidity, color, iron, chlorides, and hardness in connection with the studies of the quality of water in various parts of the United States.

*152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

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*155. Fluctuation of the water levels in wells, with special reference to Long Island, N. Y., by A. C. Veatch. 1906. 83 pp., 9 pls. 25c.

Includes general discussion of fluctuations due to rainfall and evaporation, barometric change,, temperature changes, changes in rivers, changes in lake level, tidal changes, effects of settlement, irrigation, dams, ground-water developments, and to indeterminate causes.

*160. Underground-water papers, 1906; M. L. Fuller, geologist in charge. 1906. 104 pp., 1 pl.

Gives account of work in 1905; lists publications relating to underground waters, and contains the following brief reports of general interest:

Significance of the term "artesian," by Myron L. Fuller.
Representation of wells and springs on maps, by Myron L. Fuller.
Total amount of free water in the earth's crust, by Myron L. Fuller.
Use of fluorescein in the study of underground waters, by R. B. Dole.
Problems of water contamination, by Isaiah Bowman.
Instances of improvement of water in wells, by Myron L. Fuller.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

*163. Bibliographic review and index of underground-water literature published in the United States in 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson. 1906. 130 pp. 15c.

Scope indicated by title.

*179. Prevention of stream pollution by distillery refuse, based on investigations at Lynchburg, Ohio, by Herman Stabler. 1906. 34 pp., 1 pl. 10c.

Describes grain distillation, treatment of slop, and sources, character, and effects of effluents on streams; discusses filtration, precipitation, fermentation, and evaporation methods of disposal of wastes without pollution.

*180. Turbine water-wheel tests and power tables, by R. E. Horton. 1906. 134 pp., 2 pls. 20c.

Scope indicated by title.

*185. Investigations on the purification of Boston sewage, by C.-E. A. Winslow and E. B. Phelps. 1906. 163 pp. 25c.

Discusses composition, disposal, purification, and treatment of sewages and tendencies in sewage-disposal practice in England, Germany, and the United States; describes character of crude sewage at Boston, removal of suspended matter, treatment in septic tanks, and purification in intermittent sand filtration and coarse material; gives bibliography.

*186. Stream pollution by acid-iron wastes, a report based on investigations made at Shelby, Ohio, by Herman Stabler. 1906. 36 pp., 1 pl.

Gives history of pollution by acid-iron wastes at Shelby, Ohio, and resulting litigation; discusses effect of acid-iron liquors on sewage purification processes; recovery of copperas from acid-iron wastes, and other processes for removal of pickling liquor.

*187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl. 15c.

Scope indicated by title.

*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls.

Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amounts and character of water used, raw material and finished product, and mechanical filtration.

*194. Pollution of Illinois and Mississippi rivers, by Chicago sewage (a digest of the testimony taken in the case of The State of Missouri *v.* The State of Illinois and the Sanitary District of Chicago), by M. O. Leighton. 1907. 369 pp., 2 pls.

Scope indicated by amplification of title.

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*200. Weir experiments, coefficients, and formulas (revision of paper No. 150), by R. E. Horton. 1907. 195 pp., 38 pls. 35c.

Scope indicated by title.

*226. The pollution of streams by sulphite-pulp waste, a study of possible remedies by E. B. Phelps. 1909. 37 pp., 1 pl. 10c.

Describes manufacture of sulphite pulp, the waste liquors, and the experimental work leading to suggestions as to methods of preventing stream pollution.

*229. The disinfection of sewage and sewage filter effluents, with a chapter on the putrescibility and stability of sewage effluents, by E. B. Phelps. 1909. 91 pp., 1 pl. 15c.

Scope indicated by title.

*234. Papers on the conservation of water resources. 1909. 96 pp., 2 pls. 15c.

Contains the following papers, whose scope is indicated by their titles: Distribution of rainfall, by Henry Gannett; Floods, by M. O. Leighton; Developed water powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped water powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground waters, by W. C. Mendenhall; Denudation, by R. B. Dole and Herman Stabler; Control of catchment areas, by H. N. Parker.

*235. The purification of some textile and other factory wastes, by Herman Stabler and G. H. Pratt. 1909. 76 pp. 10c.

Discusses waste waters from wool scouring, bleaching and dyeing cotton yarn, bleaching cotton piece goods, and manufacture of oleomargarine, fertilizer, and glue.

236. The quality of surface waters in the United States, Part I, Analyses of water east of the one hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.

Describes collection of samples, method of examination, preparation of solutions, accuracy of estimates, and expression of analytical results.

238. The public utility of water powers and their governmental regulation, by René Tavernier and M. O. Leighton. 1910. 161 pp. 15c.

Discusses hydraulic power and irrigation, French, Italian, and Swiss legislation relative to the development of water powers, and laws proposed in the French Parliament, reviews work of bureau of hydraulics and agricultural improvements of the French department of agricultures and gives résumé of Federal and State water-power legislation in the United States.

*255. Underground waters for farm use, by M. L. Fuller. 1910. 58 pp., 17 pls. 15c.

Discusses rocks as sources of water supply and the relative safety of supplies from different materials; springs and their protection; open or dug and deep wells, their location, yield, relative cost, protection, and safety; advantages and disadvantages of cisterns and combination wells and cisterns.

*257. Well-drilling methods, by Isaiah Bowman. 1911. 139 pp., 4 pls. 15c.

Discusses amount, distribution, and disposal of rainfall, water-bearing rocks, amount of ground water, artesian conditions, and oil and gas bearing formations; gives history of well drilling in Asia, Europe, and the United States; describes in detail the various methods and the machinery used; discusses loss of tools and geologic difficulties, contamination of well water, and methods of prevention, tests of capacity and measurement of depth, and cost of sinking wells.

*258. Underground-water papers, 1910, by M. L. Fuller, F. G. Clapp, G. C. Matson, Samuel Sanford, and H. C. Wolff. 1911. 123 pp., 2 pls. 15c.

Contains the following papers (scope indicated by titles) of general interest:
Drainage by wells, by M. L. Fuller.
Freezing of wells and related phenomena, by M. L. Fuller.
Pollution of underground waters in limestone, by G. C. Matson.
Protection of shallow wells in sandy deposits, by M. L. Fuller.
Magnetic wells, by M. L. Fuller.

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274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describes collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of the Rio Grande and of Pecos, Gallinas, and Hondo rivers.

*315. The purification of public water supplies, by G. A. Johnson. 1913. 84 pp., 8 pls. 10c.

Discusses ground, lake, and river waters as public supplies, development of waterworks systems in the United States, water consumption, and typhoid fever; describes methods of filtration and sterilization of water, and municipal water softening.

334 The Ohio Valley flood of March-April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 22 pls. 20c.

Although relating specifically to floods in the Ohio Valley, this report discusses also the cause of floods and the prevention of damage by floods.

337. The effects of ice on stream flow, by William Glenn Hoyt. 1913. 77 pp., 7 pls. 15c.

Discusses methods of measuring the winter flow of streams.

345. Contributions to the hydrology of the United States, 1914. N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

*(e) A method of determining the daily discharge of rivers of variable slope, by M. R. Hall, W. E. Hall, and C. H. Pierce, pp. 53-65.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of waters from rivers, lakes, wells, and springs in various parts of the United States, including analyses of the geyser water of Yellowstone National Park, hot springs in Montana, brines from Death Valley, water from the Gulf of Mexico, and mine waters from Tennessee, Michigan, Missouri and Oklahoma, Montana, Colorado and Utah, Nevada and Arizona, and California.

371. Equipment for current-meter gaging stations, by G. J. Lyon. 1915. 64 pp., 37 pls. 20c.

Describes methods of installing automatic and other gages and of constructing gage wells, shelters, and structures for making discharge measurements and artificial controls.

375. Contributions to the hydrology of the United States, 1915; N. C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. 15c. Contains:

(c) The relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77-84.

*(e) A method of correcting river discharge for a changing stage, by B. E. Jones, pp. 117-130.

(f) Conditions requiring the use of automatic gages in obtaining records of stream flow, by C. H. Pierce, pp. 131-139.

Papers presented at the conference of engineers of the water-resources branch in December, 1914.

*400. Contributions to the hydrology of the United States, 1916. N. C. Grover, chief hydraulic engineer. 1917. 108 pp., 7 pls. Contains:

(a) The people's interest in water-power resources, by G. O. Smith, pp. 1-8.

*(c) The measurement of silt-laden streams, by R. C. Pierce, pp. 39-51.

(d) Accuracy of stream-flow data, by N. C. Grover and J. C. Hoyt, pp. 53-59.

416. The divining rod, a history of water witching, with a bibliography, by A. J. Ellis. 1917. 59 pp. 10c.

A brief paper published "merely to furnish a reply to the numerous inquiries that are continually being received from all parts of the country" as to the efficacy of the divining rod for locating underground water.

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*425. Contributions to the hydrology of the United States, 1917. N. C. Grover, chie hydraulic engineer. Contains:

*(c) Hydraulic conversion tables and convenient equivalents. pp. 71-94.

427. Bibliography and index of the publications of the United States Geologica Survey relating to ground water, by O. E. Meinzer. 1918. 169 pp., 1 pl.

Includes publications prepared, in whole or part, by the Geological Survey that treat an phase of the subject of ground water or any subject directly applicable to ground water. Illus trated by map showing reports that cover specific areas more or less thoroughly.

ANNUAL REPORTS.

Fifth Annual Report of the United States Geological Survey, 1883-84, J. W. Powell Director. 1885. xxxvi, 469 pp., 58 pls. $2.25. Contains:

*The requisite and qualifying conditions of artesian wells, by T. C. Chamberlain, pp. 125 173, pl. 21. Scope indicated by title.

*Twelfth Annual Report of the United States Geological Survey, 1890-91, J. W Powell, Director. 1891. 2 parts. *Pt. II, Irrigation, xviii, 576 pp., 9 pls. $2. Contains:

*Irrigation in India, by H. M. Wilson, pp. 363-561, pls. 107-146. See Water-Supply Paper 57

Thirteenth Annual Report of the United States Geological Survey, 1891-92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*American irrigation engineering, by H. M. Wilson, pp. 101-349, pls. 111-146. Discusses the economic aspects of irrigation, alkaline drainage, silt and sedimentation; gives brief history of legislation; describes perennial canals in Idaho, California, Wyoming, and Arizona; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply, pumping, and subirrigation.

Fourteenth Annual Report of the United States Geological Survey, 1892-93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II, Accompanying papers, xx, 597 pp., 73 pls. $2.10. Contains:

*The potable waters of the eastern United States, by W. J. McGee, pp. 1-47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

*Natural mineral waters of the United States, by A. C. Peale, pp. 49-88, pls. 3 and 4. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analyses of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral-spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897-98, Charles D. Walcott, Director. 1898. (Pts. II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. II, Papers chiefly of a theoretic nature, v. 958 pp., 172 pls. $2.65. Contains:

*Principles and conditions of the movements of ground water, by F. H. King, pp. 59-294, pls. 6-16. Discusses the amount of water stored in sandstone, in soil, and in other rocks, the depth to which ground water penetrates; gravitational, thermal, and capillary movements of ground waters, and the configuration of the ground-water surface; gives the results of experimental investigations on the flow of air and water through a rigid, porous, medium, and through sand, sandstones, and silts; discusses results obtained by other investigators, and summarizes results of observations; discusses also rate of flow of water through sand and rock, the growth of rivers, rate of filtration through soil, interference of wells, etc.

*Theoretical investigation of the motion of ground waters, by C. S. Slichter, pp. 295-384 pl. 17. Scope indicated by title.

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PROFESSIONAL PAPERS.

*72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate, population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee River basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chattahoochee, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

*86. The transportation of débris by running water, by G. K. Gilbert, based on experiments made with the assistance of E. C. Murphy. 1914. 263 pp., 3 pls. 70c.

The results of an investigation which was carried on in a specially equipped laboratory at Berkeley, Calif., and was undertaken for the purpose of learning "the laws which control the movement of bed load and especially to determine how the quantity of load is related to the stream slope and discharge and to the degree of comminution of the débris."

A highly technical report.

105. Hydraulic-mining débris in the Sierra Nevada, by G. K. Gilbert. 154 pp., 34 pls. 1917. 50c.

Presents the results of an investigation undertaken by the United States Geological Survey in response to a memorial from the California Miners' Association asking that a particular study be made of portions of the Sacramento and San Joaquin valleys affected by detritus from torrential streams. The report deals largely with geologic and physiographic aspects of the subject, traces the physical effects, past and future, of the hydraulic mining of earlier decades, the similar effects which certain other industries induce through stimulation of the erosion of the soil, and the influence of the restriction of the area of inundation by the construction of levees. Suggests cooperation by several interests for the control of the streams now carrying heavy load of débris.

BULLETINS.

*32. Lists and analyses of the mineral springs of the United States (a preliminary study), by A. C. Peale. 1886. 235 pp.

Defines mineral waters, lists the springs by States, and gives tables of available analyses.

*319. Summary of the controlling factors of artesian flows, by Myron L. Fuller. 44 pp. 1908. 10c.

Describes underground reservoirs, the sources of ground waters, the confining agents, the primary and modifying factors of artesian circulation, the essential and modifying factors of artesian flow, and typical artesian systems.

479. The geochemical interpretation of water analyses, by Chase Palmer. 1911. 31 pp. 5c.

Discusses the expression of chemical analyses, the chemical character of water and the properties of natural waters; gives a classification of waters based on property values and reacting values, and discusses the character of the waters of certain rivers as interpreted directly from the results of analyses; discusses also the relation of water properties to geologic formation, silica in river water, and the character of the water of the Mississippi and the Great Lakes and St. Lawrence River as indicated by chemical analyses.

*616. The data of geochemistry (third edition), by F. W. Clarke. 1916. 821 pp. 45c.

Earlier editions were published as Bulletins 330 and 491. Contains a discussion of the statement and interpretation of water analyses, and a chapter on "Mineral wells and springs" (pp. 179-216). Discusses the definition and classification of mineral waters, changes in the composition of water, deposits of calcareous, ocherous, and siliceous materials made by water, vadose and juvenile waters, and thermal springs in relation to volcanism. Describes the different kinds of ground water and gives typical analyses. Includes a brief bibliography of papers containing water analyses.

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[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications as noted in abstracts.

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ALBERT B. FALL, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

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WATER-SUPPLY PAPER 482

SURFACE WATER SUPPLY OF THE UNITED STATES
1918

PART XII. NORTH PACIFIC SLOPE DRAINAGE BASINS

A. PACIFIC BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
G. L. PARKER and W. A. LAMB, District Engineers

Prepared in cooperation with the States of
WASHINGTON and MONTANA

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A. PACIFIC BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
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Prepared in cooperation with the States of
WASHINGTON and MONTANA

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SURFACE WATER SUPPLY OF PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN, 1918.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting results of measurements of streams in the United States during the year ending September 30, 1918.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in he organic law (20 Stat. L., p. 394):

> *Provided*, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies relating to irrigation in the arid West. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ending June 30, 1895–1919.

1895	$12,500.00
1896	20,000.00
1897 to 1900, inclusive	50,000.00
1901 to 1902, inclusive	100,000.00
1903 to 1906, inclusive	200,000.00
1907	150,000.00
1908 to 1910, inclusive	100,000.00
1911 to 1917, inclusive	150,000.00
1918	175,000.00
1919	148,244.10

In this work many private and State organizations have cooperated, either by furnishing data or by assisting in their collection. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 5.

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Measurements of stream flow have been made at about 4,510 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1918, 1,180 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the water-supply papers from time to time.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with work of a certain class. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, and acre-feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross-section, 1 foot wide and 1 foot deep, at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in inches.

An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

"Stage-discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," a term used to designate the section or sections of the stream below the gage which determine the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

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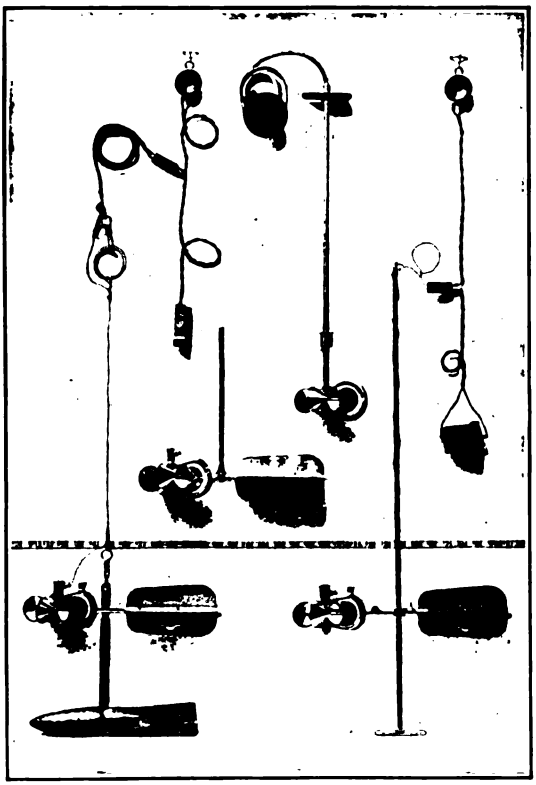
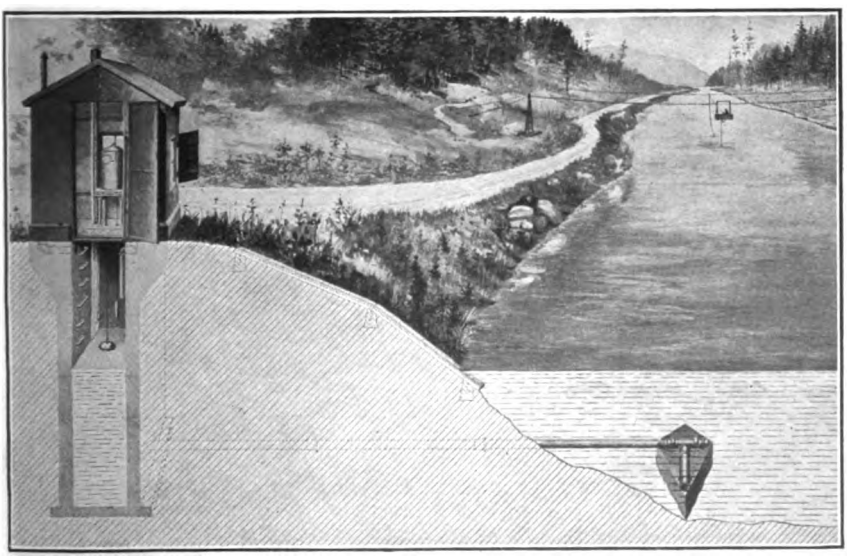


A. PRICE CURRENT METERS



B. TYPICAL GAGING STATION.

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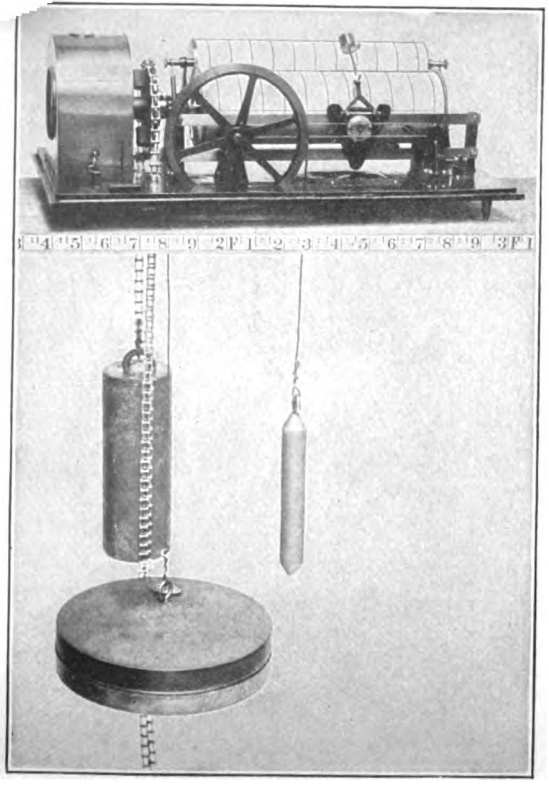

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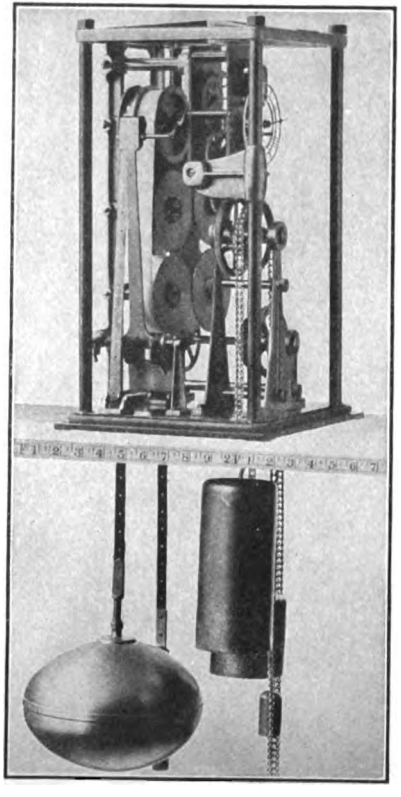
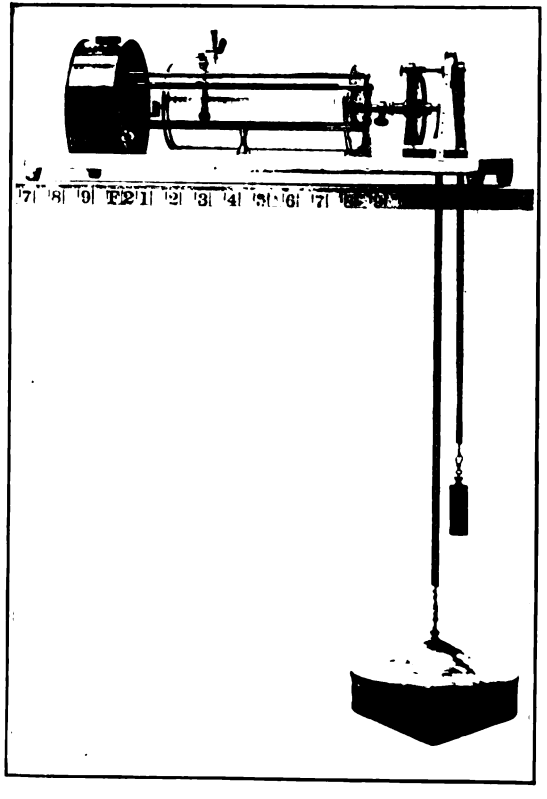


B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

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The "point of zero flow" for a given gaging station is that point on the gage—the gage height—to which the surface of the stream falls when the discharge is reduced to zero.

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1917, and ending September 30, 1918. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for a year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter. (See Pls. I, II.) The general methods are outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements, rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to the gage heights, give the daily discharge from which the daily, monthly, and yearly means of discharge are determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving records of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage height and records of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanence of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

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The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the mean daily discharge is obtained by averaging discharge at regular intervals during the day or by using the discharge integrator, an intrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 2 are based.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of stream-flow data depends primarily (1) on the permanence of the stage-discharge relation and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of records.

A paragraph in the description of the station gives information regarding (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage height to the rating table to obtain the daily discharge. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth in inches may be subject to gross errors caused by the inclusion of large non-contributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the

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flow of the river above the station. "Second-feet per square mile" and "run-off in inches" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off in inches" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the table of daily discharge allows more detailed study of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

The work in Washington and Montana was carried on under cooperative agreements between the United States Geological Survey and the respective States. Cooperation with the States is effected under contracts which are made between the Director of the United States Geological Survey and the State engineers or other officials and are authorized by legislative acts appropriating moneys.

The work in Washington was carried on in cooperation with the Board of Geological Survey, composed of Ernest Lister, governor, chairman; L. F. Hart, lieutenant governor, vice chairman; W. W. Sherman, State treasurer, secretary; Henry Suzzallo, president of the University of Washington; and E. O. Holland, president of the State College. The board was efficiently represented in the cooperative investigations by Henry Landes, State geologist.

Acknowledgments are due to Mr. A. W. Mahon, State engineer of Montana, for the efficient manner in which he represented his State in the cooperative investigations.

Acknowledgments are due to the United States Reclamation Service, the United States Forest Service, and the United States Office of Indian Affairs for assistance, suggestions, and the freest use of data gathered exclusively for them and paid for by them. Acknowledgments are also due to the United States Weather Bureau for hydrographic and climatologic data.

Acknowledgments are due to the Hydrometric Survey of British Columbia, for complete records of Columbia River at Trail, B. C.

Acknowledgment for gage-height records and discharge measurements furnished by cooperating parties is made in the descriptions of gaging stations.

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DIVISION OF WORK.

The data for stations in Washington were collected under the direction of G. L. Parker, district engineer, assisted by Lasley Lee, James E. Stewart, D. J. Calkins, L. D. Carson, T. G. Bedford, T. R. Newell, and R. B. Kilgore; and prepared for publication by W. E. Dickinson, Lasley Lee, E. C. Howard, and L. D. Carson.

The data for stations in Montana were collected and prepared for publication under the direction of W. A. Lamb, district engineer, assisted by A. H. Tuttle.

The data for stations in the Yakima River basin, exclusive of stations in Yakima Indian Reservation, were collected by and prepared for publication in cooperation with Paul Taylor, engineer in charge of hydrometric work, United States Reclamation Service, assisted by F. E. Moxley.

The manuscript was prepared by W. E. Dickinson and A. H. Tuttle.

GAGING-STATION RECORDS.

QUINAULT RIVER BASIN.

QUINAULT RIVER AT QUINAULT LAKE, WASH.

LOCATION.—In sec. 25, T. 23 N., R. 10 W., at outlet of Quinault Lake, 4 miles southwest of Quinault and 33 miles north of Hoquiam, in Grays Harbor County.

DRAINAGE AREA.—264 square miles (measured on Plate I, Professional Paper 7).

RECORDS AVAILABLE.—October 29, 1911, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank 350 feet below Olympic highway crossing at outlet of Quinault Lake, installed September 27, 1916, at different datum from previous gage; inspected by C. S. Locke and Fred Halbert. Previous gages as follows: Prior to January 1, 1913, staff gage on south shore of lake 3 miles northeast of present site; January 1, 1913, to September 30, 1916, staff gage on Canoe Creek 400 feet above its mouth, 4 miles northeast of present site at datum 1.05 feet higher than datum of original gage. All readings prior to October 1, 1916, have been referred to datum of gage on Canoe Creek.

DISCHARGE MEASUREMENTS.—Made from boat or from cable 700 feet above gage.

CHANNEL AND CONTROL.—Bed composed of boulders. Well-defined control 600 feet below gage. Left bank high and wooded; not subject to overflow; right bank high, wooded, and subject to overflow at about gage height 20 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.8 feet at 3 p. m. December 18 (discharge, 32,300 second-feet); minimum stage recorded, 0.90 foot at 8 a. m. September 28 (discharge, 425 second-feet).

1911–1918: Maximum stage recorded, 16.3 feet at 8 a. m. January 6, 1914 (discharge, 32,500 second-feet); minimum stage recorded, 0.4 foot at 7 a. m. October 1, 1915 (discharge, 395 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder unsatisfactory as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage-height graph or, for days of

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considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records good except during periods when recorder was not operating, for which they are fair.

Discharge measurements of Quinault River at Quinault Lake, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 15	Parker and Locke.....	8.26	12,000	Dec. 17	Parker and Locke.....	10.69	20,000
16	.....do.....	12.58	24,400	Aug. 19	G. L. Parker.....	2.05	1,120
16	.....do.....	12.22	24,700	23	.....do.....	1.85	960

Daily discharge, in second-feet, of Quinault River at Quinault Lake, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	998	571		21,000	2,380	1,640	3,430	2,240	1,500	1,220	641	636
2	1,460	558		14,700	2,310	1,520	2,990	2,240	1,470	1,190	658	625
3	2,240	1,050	2,370	11,600	2,840	1,470	2,640	2,500	1,520	1,140	674	595
4	2,180	2,180		11,100	6,030	1,420	2,380	2,920	1,640	1,120	652	585
5	1,930	3,340		9,360	8,000		2,180	2,850	1,870	1,070	636	576
6	1,640	4,380	2,710	9,130	8,220		2,050	2,570	1,990	1,060	615	548
7	1,470	3,730	2,570	9,130	8,000	1,300	1,930	2,380	1,990	1,020	590	540
8	1,310	2,920	2,310	7,360	6,360		1,990	2,180	2,440	989	599	527
9	1,170	2,440	2,180	5,980	7,170		3,100	1,990	3,060	989	625	519
10	1,070	2,050	2,120	5,070	10,800		3,730	1,870	2,920		733	515
11	980	2,050	2,620	4,720	8,670		3,430	1,870	2,710		855	515
12	912	2,240	3,660	4,890	6,750		3,130	1,870	2,570	960	831	511
13	855	2,310	7,020	4,550	5,250		2,850	1,930	2,380		780	503
14	822	2,120	15,100	4,380	4,380	1,250	2,640	1,930	2,120		739	499
15	773	1,870	13,300	4,380	3,580		2,500	1,870	1,930		745	495
16	745		21,300	4,130	3,130		2,380	1,810	1,810		839	495
17	715		18,700	5,320	2,780		2,240		1,690		1,040	488
18	685	1,470	27,800	8,220	2,500		2,120	1,660	1,640	840	1,130	484
19	658		21,300	6,750	2,240		2,050		1,640		1,130	481
20	641		13,600	5,250	2,120	5,300	2,240		1,690		1,060	470
21	630		8,220	4,210	1,930		2,710		1,750		972	470
22	625		10,600	3,660	1,810		3,060		1,750		946	467
23	605	2,050	8,900	3,360	1,750	7,570	2,990	1,480	1,750		946	460
24	625		6,750	3,130	1,640	9,740	2,850		1,640	750	904	453
25	658		5,250	3,060	1,810	10,800	2,640		1,580		855	446
26	663		4,720	2,850	1,990	8,000	2,440		1,470		808	442
27	668		8,330	2,710	1,870	5,980	2,240		1,470	703	766	436
28	658	4,950	13,900	2,640	1,690	5,430	2,180	1,480	1,360	685	721	428
29	641		27,800	2,920	.....	4,720	2,180		1,310	674	685	422
30	620		19,900	2,780	.....	4,210	2,180		1,260	652	663	432
31	590		18,700	2,500	.....	3,890	.....		.....	641	641	.....

NOTE.—Water-stage recorder not operating during periods inclosed by braced figures. These figures represent mean daily discharge for the priods indicated, being based on range of stage and weather records, except beginning with March, when estimates are based on comparison with flow of North Fork of Skokomish River.

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Monthly discharge of Quinault River at Quinault Lake, Wash., for the year ending Sep 30, 1918.

[Drainage area, 264 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	2,240	590	975	3.69	4.25	60,00
November	4,350	558	2,040	7.73	8.62	121,00
December	27,800	2,120	9,720	36.8	42.43	596,00
January	21,000	2,500	6,160	23.3	26.86	379,00
February	10,800	1,640	4,210	15.9	16.56	234,00
March	10,800	.....	3,660	13.9	16.03	225,00
April	3,730	1,930	2,580	9.77	10.90	154,00
May	2,920	.....	1,870	7.08	8.16	115,00
June	3,060	1,260	1,860	7.05	7.87	111,00
July	1,220	641	888	3.36	3.87	54,60
August	1,130	590	789	2.99	3.45	48,50
September	636	428	502	1.90	2.12	29,90
The year	27,800	428	2,940	11.1	151.12	2,130,00

SOLEDUCK RIVER BASIN.

SOLEDUCK RIVER NEAR FAIRHOLM, WASH.

LOCATION.—In lot 4, sec. 35, T. 30 N., R. 10 W., 300 feet below South Fork and 7 miles southwest of Fairholm (on Crescent Lake), in Clallam County.

DRAINAGE AREA.—79 square miles (measured on Plate I, Professional Paper 7).

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by T. F. Rixon.

DISCHARGE MEASUREMENTS.—Made from cable 600 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of bedrock and boulders; apparently permanent. No well-defined control. One channel at all stages. Banks high and wooded.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 11.7 feet at 6 a. m. December 18 (discharge, 18,600 second-feet); minimum stage recorded, 0.48 foot at 8 a. m. September 29 (discharge, 58 second-feet).

ICE.—None.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 8,000 second-feet; extended above. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent except for periods estimated for which they are good.

COOPERATION.—Station maintained in cooperation with Straits Power Co.

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Discharge measurements of Soleduck River near Fairholm, Wash., during the period Aug. 29, 1917, to Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Aug. 29	Parker and Langloe	1.14	164	May 4	G. L. Parker	2.56	758
30	G. L. Parker	1.16	163	5	do	2.31	635
Nov. 4	Rixon and Ahlvers	1.79	388	July 29	Parker and Rixon	.92	122
Dec. 16	do	6.08	5,290	Aug. 29	Parker and Kilgore	.77	94
20	Lasley Lee	3.70	1,640	Sept. 27	R. B. Kilgore	.52	62
22	do	5.05	3,400				

Daily discharge, in second-feet, of Soleduck River near Fairholm, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		110	424	4,730	566	361	732	575	388	231	111	
2		222	331	2,440	527	335	630	630	348	222	118	
3	250	494	295	2,760	1,370	327	556	759	298	204	130	84
4		379	420	2,440	3,180	302	513	842	310	199	114	
5		542	366	1,800	2,070	279	489	630	379	196	108	
6		397	424	2,360	1,800	268	461	537	475	196	100	
7	150	241	348	1,900	1,420	261	452	503	513	190	97	
8		188	314	1,510	1,190	258	581	466	484	185	106	76
9		155	406	1,190	4,410	251	1,630	429	583	188	116	
10	92	151	348	1,070	3,030	241	1,040	438	1,070	210	199	
11	97	145	811	1,150	1,560	231	786	438	605	196	207	
12	103	151	860	1,240	1,190	216	680	452	537	172	138	
13	108	149	3,590	1,040	934	210	605	475	537	160	116	74
14	112	130	4,580	1,150	786	276	570	484	452	158	109	
15	114	119	4,230	1,070	706	360	518	479	383	160	158	
16	119	114	8,410	967	655	842	498	443	361	158	160	
17	123	106	3,760	2,720	605	1,120	475	433	370	158	142	
18	121	101	11,500	2,380	542	1,280	438	415	344	160	140	71
19	123	101	3,230	1,370	494	902	494	406	340	158	134	
20	119	304	1,750	1,040	456	934	732	392	348	165	119	
21	121	401	1,770	872	433	2,190	842	348	397	167	118	
22	118	231	4,110	814	420	2,380	814	327	392	151	153	63
23	114	177	1,700	786	401	1,460	732	323	361	140	153	
24	123	158	1,240	814	370	3,730	655	302	348	134	123	
25	128	155	1,040	732	429	2,190	570	291	298	134	111	60
26	136	140	1,030	680	410	1,240	503	279	287	138	108	62
27	132	433	3,350	630	366	967	484	283	291	130	103	62
28	123	537	5,480	759	352	902	503	331	261	123	98	60
29	118	415	11,000	706	.....	872	537	406	237	118	95	59
30	114	605	3,150	630	.....	934	556	580	231	116	94	59
31	114	.....	5,910	580	.....	814	.....	484	.....	111	91	.....

NOTE.—Water-stage recorder installed Oct. 10; discharge Oct. 1-9 estimated from gage-height record at Schneider's ranch. Braced figures show estimated mean discharge for periods indicated. During September estimates based on flow of Lyre River and weather records.

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Monthly discharge of Soleduck River near Fairholm, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 79 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	.....	92	143	1.81	2.09	8,790
November	605	101	252	3.19	3.56	15,000
December	11,500	295	2,780	35.2	40.58	171,000
January	4,730	580	1,430	18.1	20.87	87,900
February	4,410	352	1,100	13.9	14.47	61,100
March	3,730	210	869	11.0	12.68	53,400
April	1,630	438	636	8.05	8.98	37,800
May	842	279	457	5.78	6.66	28,100
June	1,070	231	408	5.16	5.76	24,300
July	231	111	165	2.09	2.41	10,100
August	207	91	125	1.58	1.82	7,690
September	.....	59	71.3	.903	1.01	4,240
The year	11,500	59	703	8.90	120.89	509,000

LYRE RIVER BASIN.

LYRE RIVER AT PIEDMONT, WASH.

LOCATION.—In NE. ¼ sec. 15, T. 30 N., R. 9 W., 1,300 feet below outlet of Crescent Lake and half a mile west of Piedmont, in Clallam County.

DRAINAGE AREA.—49.5 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; referred to inside and outside staff gages; inspected by T. F. Rixon.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 1,000 feet above gage.

CHANNEL AND CONTROL.—Channel composed of bedrock and boulders. Banks medium high and wooded. Control was a series of rapids over bedrock at and below gage, until September 25, when construction of railroad trestle 125 feet below gage was begun. Material dumped into the stream changed control, at least temporarily.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.91 feet at noon January 4 (discharge, 1,080 second-feet); minimum discharge, 32 second-feet by meter measurement at noon September 29 (stage-discharge relation affected by backwater from construction of trestle below gage).

ICE.—None.

DIVERSIONS.—None.

REGULATION.—Flow is very uniform because of natural regulation in Crescent Lake.

ACCURACY.—Stage-discharge relation permanent from November 30 to September 24, after which there was backwater from construction of railroad trestle below gage. October 15 to November 16, 1917, gage was referred to a datum differing an unknown amount from that used thereafter. Rating curves well defined below 800 second-feet; extended above. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records excellent after December 22; good prior to that date except for estimated periods.

COOPERATION.—Station maintained in cooperation with Straits Power Co.

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Discharge measurements of Lyre River at Piedmont, Wash., during the period Aug. 31, 1917, to Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Aug 31	G. L. Parker	[a]2.13	66	May 2	G. L. Parker	2.90	243
Oct. 19	Rixon and Ahlvers	[b].98	68	July 27	do	2.10	67
Nov. 5	do	[b]1.05	77	Aug. 28	Kilgore and Parker	2.07	56
30	do	[c]2.21	86	Sept. 11	R. B. Kilgore	1.96	44
Dec. 21	Lee and Rixon	4.82	623	22	do	1.88	36
May 1	G. L. Parker	2.92	253	29	do	1.98	32

[a] Referred to present datum.
[b] Referred to arbitrary datum; exact relation to present datum not determined.
[c] This and succeeding measurements referred to present datum.

Daily discharge, in second-feet, of Lyre River at Piedmont, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		50	86	1,020	348	330	414	250	169	102	61	56
2		54	90	990	343	314	400	250	164	102	64	53
3		63	96	990	348	312	374	250	159	100	63	51
4	72	66	100	1,020	387	314	361	252	157	98	61	50
5		73	102	1,020	414	306	348	252	154	98	58	49
6		69	102	990	440	299	340	255	152	96	57	49
7		69	102	931	440	293	335	250	149	94	57	48
8		69	102	873	440	288	330	248	152	90	56	45
9		69	102	786	535	286	400	242	154	92	51	45
10		71	102	729	659	278	379	240	169	96	53	45
11	70	73		687	673	273	358	232	169	90	51	45
12		76		659	687	268	338	230	166	88	50	44
13		76		603	645	260	317	225	164	86	49	44
14		73	238	576	617	258	319	222	159	82	50	44
15	68	73		562	576	258	314	220	154	82	61	44
16	68	73		522	548	268	306	220	149	80	63	44
17	66	73		548	522	278	301	220	149	78	66	44
18	66	73	374	617	481	291	296	218	142	78	68	42
19	66	73	603	589	440	296	291	215	138	78	66	40
20	66	73	673	562	414	306	286	212	136	78	66	39
21	65	73	659	522	387	332	280	205	131	77	69	38
22	65	73	701	494	374	374	278	200	129	73	77	36
23	65	73	673	454	361	387	275	195	126	71	69	35
24	62	73	617	454	348	494	273	190	124	68	71	35
25	61	73	599	427	348	535	270	185	120	68	69	34
26	59	73	576	414	348	535	268	181	117	66	68	34
27	56	75	576	387	345	535	262	176	117	64	64	33
28	53	78	631	387	335	508	260	171	111	63	63	33
29	53	80	844	374	.....	481	255	171	109	61	61	32
30	51	82	902	361	.....	454	250	171	104	61	58	32
31	51	.....	960	348	.....	427	.....	169	.....	60	57	.....

NOTE.—No gage-height record Oct. 1-14 and Nov. 17-29; discharge estimated from precipitation records. Dec. 11-17 and Apr. 10-12, discharge interpolated because of defective gage-height record. Sept. 25-30, backwater; discharge Sept. 29 from meter measurement; Sept. 30 estimated same as Sept. 29; Sept. 25-28, interpolated.

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Monthly discharge of Lyre River at Piedmont, Wash., for the year ending Sept. 30, 1918

[Drainage area, 49.5 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	.....	51	65.6	1.33	1.53	4,03
November	82	50	71.4	1.44	1.61	4,25
December	960	86	388	7.84	9.04	23,90
January	1,020	348	642	13.0	14.99	39,50
February	687	335	457	9.23	9.61	25,40
March	535	258	350	7.07	8.15	21,50
April	414	250	316	6.38	7.12	18,80
May	255	169	217	4.38	5.05	13,300
June	169	104	143	2.89	3.22	8,510
July	102	60	81.3	1.64	1.89	5,000
August	77	49	61.2	1.24	1.43	3,760
September	56	32	42.1	.851	.95	2,510
The year	1,020	32	235	4.75	64.59	170,000

PUGET SOUND BASINS.

SKOKOMISH RIVER BASIN.

NORTH FORK OF SKOKOMISH RIVER NEAR HOODSPORT, WASH.

LOCATION.—In SW. ¼ sec. 5, T. 22 N., R. 4 W., at footbridge on Forest Service trail to South Fork of Skokomish River, 4 miles below Lake Cushman and 4 miles northwest of Hoodsport, in Mason County.

DRAINAGE AREA.—91 square miles (measured on Plate I, Professional Paper 7).

RECORDS AVAILABLE.—Aug. 17, 1910, to Sept. 22, 1911, fragmentary; February 1, 1913, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank just below trail bridge; inspected by L. L. Dickinson and Phillip Abbey. Datum raised 5.0 feet September 2, 1918. (Vertical staff 25 feet below bridge used 1910–11.)

DISCHARGE MEASUREMENTS.—Made from cable about a mile above gage or by wading.

CHANNEL AND CONTROL.—Composed of rock and gravel; slightly shifting. Banks high, not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 19.60 feet at 1 p. m. December 18 (discharge, 9,580 second-feet); minimum stage, from recorder, 0.77 foot September 28 (discharge, 89 second-feet).

1913–1918: Maximum stage estimated at 23.5 feet January 6, 1914, during part of day when recorder was not operating (discharge, estimated, 14,000 second-feet); minimum stage recorded in 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—Flow subject to natural regulation at Lake Cushman.

ACCURACY.—Stage-discharge relation changed December 18 during high water. Drift in stream resulting from forest fire on September 10 caused backwater during remainder of year. Rating curves prior to September 10 well defined; curve after that date poorly defined. Operation of water-stage recorder excellent except for periods indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent except during period September 10 to 30 for which they are fair.

COOPERATION.—Station maintained in cooperation with city of Tacoma.

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Discharge measurements of North Fork of Skokomish River near Hoodsport, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 27	G. L. Parker	8.01	650	Aug. 25	G. L. Parker	5.98	143
28	do	8.02	651	Sept. 4	do	a.79	115
Aug. 9	Parker and Taylor	6.00	147				

a Gage established Sept. 2, at datum 5.00 feet higher than previous datum.

Daily discharge, in second-feet, of North Fork of Skokomish River near Hoodsport, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	162	144	448	4,410	583	467	1,000	730	495		164	127
2	188	166	406	3,010	568	453	872	765	439		162	124
3	280	511	406	2,660	761	439	782	908	399	280	160	123
4	271	747	582	2,660	2,000	439	747	1,000	399		158	117
5	242	2,120	566	2,280	2,340	412	662	872	439		155	117
6	218	1,190	521	2,340	2,660	386	630	730	495	251	153	116
7	204	713	462	2,460	2,280	373	630	662	568	246	151	113
8	198	506	406	1,920	1,620	358	713	646	553	242	149	113
9	190	392	392	1,570	1,720	360	1,520	568	553	242	149	113
10	184	366	366	1,320	2,660	350	1,420	553	730	264	157	109
11	182	420	462	1,240	1,820	359	1,080	553	679	264	166	104
12	178	735	679	1,200	1,420	350	927	598	583	242	159	102
13	171	764	1,400	1,080	1,160	338	818	630	553	225	147	102
14	168	582	4,020	1,080	1,000	360	747	614	510	217	142	102
15	166	462	2,850	1,040	890	399	662	583	453	213	142	102
16	160	392	7,000	1,000	836	439	630	553	426	215	177	104
17	150	353	4,200	1,770	765	671	583	538	412	217	240	104
18	146	319	7,770	2,810	713	1,620	553	510	399	217	227	102
19	141	292	4,310	1,720	630	1,160	568	495		211	197	99
20	138	302	2,280	1,280	614	1,000	713	467		203	177	100
21	133	379	1,720	1,080	553	1,640	927	439		197	161	100
22	132	366	2,520	983	524	2,660	1,000	426		190	154	99
23	130	322	2,040	890	524	1,870	927	412		186	152	98
24	130	290	1,470	854	495	3,220	854	412		182	147	96
25	132	273	1,240	800	510	3,260	782	399	360	178	144	93
26	135	255	1,280	747	524	1,920	696	386		178	144	93
27	133	300	2,700	696	495	1,420	662	386		176	139	90
28	132	448	3,560	679	467	1,200	662	399		174	134	89
29	138	448	6,280	679	.....	1,160	696	481		171	130	90
30	144	448	3,780	630	.....	1,160	713	583		169	127	93
31	143	.....	4,850	598	.....	1,160	.....	583	.....	167	127	.....

NOTE.—Braced figures show estimated daily discharge for periods indicated. July 27 to Aug. 7, discharge interpolated.

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Monthly discharge of North Fork of Skokomish River near Hoodsport, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 91 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	280	130	168	1.85	2.13	10,300
November	2,120	144	500	5.49	6.12	29,800
December	7,770	366	2,290	25.2	29.05	141,000
January	4,410	598	1,530	16.8	19.37	94,100
February	2,660	467	1,110	12.2	12.70	61,600
March	3,260	338	1,010	11.1	12.80	62,100
April	1,520	553	806	8.86	9.88	48,000
May	1,000	386	577	6.34	7.31	35,500
June	730	.....	447	4.91	5.48	26,600
July	.....	167	221	2.43	2.80	13,600
August	240	127	158	1.74	2.01	9,720
September	127	89	104	1.14	1.27	6,190
The year	7,770	89	744	8.18	110.92	539,000

PUYALLUP RIVER BASIN.

PUYALLUP RIVER NEAR ELECTRON, WASH.

LOCATION.—In NE. ¼ NW. ¼ sec. 3, T. 16 N., R. 6 E., 1,000 feet above intake of Puget Sound Traction, Light & Power Co.'s flume, a quarter of a mile below Mowich River, and 10 miles southeast of Electron, Pierce County.

DRAINAGE AREA.—91 square miles (measured on Plate IV, Water-Supply Paper 313).

RECORDS AVAILABLE.—January 1, 1909, to September 30, 1918.

GAGE.—Freiz water-stage recorder on left bank on downstream side of gaging bridge; inspected by William Chambers. Datum lowered 1.00 foot March 9, 1918.

DISCHARGE MEASUREMENTS.—Made from gaging bridge at gage.

CHANNEL AND CONTROL..—Bed composed of boulders and glacial débris; shifting at all stages owing to steep gradient.

EXTREMES OF DISCHARGE.—Maximum stage during year (estimated from incomplete gage-height record) 6.4 feet at noon December 18 (discharge, 4,800 second-feet); minimum stage recorded, 0.71 foot at 2 p. m. November 19 (discharge, 152 second-feet).

1909–1918: Maximum stage on December 18, 1917; minimum discharge on December 24, 1914, estimated at 112 second-feet (stage-discharge relation affected by ice).

ICE. Stage-discharge relation not affected by ice during year.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed frequently. Indirect method for shifting control, based on two standard rating curves, well defined below 1,500 second-feet, one used until December 18 and the other for remainder of year. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table, mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records good.

COOPERATION.—Puget Sound Traction, Light & Power Co. furnished gage-height record and made discharge measurements.

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Discharge measurements of Puyallup River near Electron, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	Barber and Chambers..	1.36	389	Apr. 5	Barber and Chambers..	1.12	270
30	.....do.....	.83	182	21	.....do.....	1.79	486
Nov. 11	.....do.....	.91	200	May 5	.....do.....	2.00	639
22	.....do.....	1.26	352	20	.....do.....	1.63	463
Dec. 8	Lee and Barber.....	.81	176	June 2	.....do.....	1.56	430
8	Barber and Chambers..	.82	178	28	.....do.....	1.91	566
Jan. 8	.....do.....	2.69	985	July 7	.....do.....	1.96	607
21	.....do.....	2.03	626	23	.....do.....	2.00	611
Feb. 3	.....do.....	1.64	466	Aug. 6	.....do.....	1.87	591
19	.....do.....	1.18	287	23	.....do.....	2.24	854
Mar. 12	.....do.....	.79	166	Sept. 8	.....do.....	1.71	495
26	.....do.....	1.73	500	23	Barber and Brev.....	1.20	292

NOTE.—Gage datum lowered 1.00 foot, effective at noon, Dec. 18, 1917.

Daily discharge, in second-feet, of Puyallup River near Electron, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	321	190	228	2,370	417	228	381	450	522	675	1,070	675
2	359	204	198	1,590	381	216	334	505	450	651	881	608
3	383	588	218	1,500	438	219	300	700	405	604	627	558
4	373	390	269	1,360	910	204	282	828	479	548	566	522
5	393	330	212	1,160	1,060	198	265	651	675	576	589	535
6	340	251	222	1,130	1,080	190	255	518	937	589	675	518
7	349	215	190	1,220	937	187	262	471	1,100	627	651	514
8	423	196	178	1,020	725	192	293	450	1,070	750	651	544
9	388	183	198	828	608	176	486	409	1,190	854	544	585
10	359	204	183	675	882	168	463	357	1,340	750	636	580
11	313	204	326	1,150	750	171	397	342	1,160	613	651	562
12	296	209	499	1,400	622	168	365	381	1,240	544	522	580
13	330	201	2,410	1,020	535	158	330	417	1,340	576	596	622
14	383	178	2,330	935	463	161	286	454	1,070	675	618	599
15	305	166	1,320	802	421	166	276	417	802	881	609	627
16	234	163	1,780	802	401	179	265	450	750	1,040	484	627
17	196	159	2,260	1,030	381	220	248	488	776	1,280	448	589
18	185	163	3,990	1,280	353	326	232	484	700	1,400	599	518
19	201	159	2,540	935	304	235	265	458	700	984	501	627
20	196	217	1,680	750	282	225	361	471	750	675	434	589
21	251	288	1,360	651	265	251	505	425	956	580	468	442
22	222	336	1,850	669	255	480	566	393	1,040	675	750	353
23	212	280	1,660	664	272	444	501	373	962	651	891	330
24	276	225	1,280	776	245	750	475	357	828	651	881	315
25	326	196	1,100	700	245	675	417	330	725	651	801	361
26	288	178	1,690	594	255	518	369	315	750	700	750	425
27	310	198	2,860	544	232	434	361	304	750	536	618	458
28	209	212	2,890	576	228	381	373	338	618	627	589	580
29	196	261	3,110	514	.....	381	409	458	553	750	675	651
30	185	349	2,500	463	.....	430	438	675	627	828	750	622
31	190	.....	2,200	421	.....	413	.....	651	.....	935	776	.....

NOTE.—Recorder not in operation Dec. 18-25, and Dec. 27 to Jan. 2; staff gage read daily during this period.

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Monthly discharge of Puyallup River near Electron, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 91 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	423	185	290	3.19	3.68	17,800
November	588	159	236	2.59	2.89	14,000
December	3,990	178	1,410	15.5	17.87	86,700
January	2,370	421	953	10.5	12.11	58,600
February	1,080	228	498	5.47	5.70	27,700
March	750	158	295	3.24	3.74	18,100
April	566	232	359	3.95	4.41	21,400
May	828	304	462	5.08	5.86	28,400
June	1,340	405	842	9.25	10.32	50,100
July	1,400	536	738	8.11	9.35	45,400
August	1,070	434	655	7.20	8.30	40,300
September	675	315	537	5.90	6.58	32,000
The year	3,990	158	608	6.68	90.81	440,000

PUYALLUP RIVER AT ALDERTON, WASH.

LOCATION.—On township line between sec. 25, T. 20 N., R. 4 E., and sec. 30, T. 20 N., R. 5 E., at county bridge No. 78, 1 mile north of Alderton, Pierce County, and 1½ miles above Stuck River.

DRAINAGE AREA.—410 square miles (measured on drainage map published in Water-Supply Paper 313).

RECORDS AVAILABLE.—November 20, 1914, to September 30, 1918.

GAGE.—Vertical staff in two sections on downstream side of bridge pier on right bank; read by Mrs. C. E. Bearney and Mrs. H. D. Foster. Datum of gage lowered 1.00 foot, August 5, 1918.

DISCHARGE MEASUREMENTS.—Made from bridge at gage.

CHANNEL AND CONTROL.—Bed composed of silt and gravel; shifting. No well-defined control. Right bank is overflowed at gage height about 8 feet; left bank high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.6 feet at 8 p. m. December 18 (discharge, 19,300 second-feet); minimum stage recorded, 0.63 foot at 1.30 p. m. November 17, and 8 a. m. November 19 (discharge, 409 second-feet).

1915–1918: Maximum stage recorded, December 18, 1917; minimum stage recorded, 1.90 feet December 22 and 24, 1914, September 29–30 and October 12, 1915 (discharge, 390 second-feet).

ICE.—Stage-discharge relation not affected by ice during year.

DIVERSIONS.—None.

REGULATION.—Operation of the Puget Sound Traction, Light & Power Co.'s plant at Electron does not materially affect natural flow, as pondage utilized is small.

ACCURACY.—Stage-discharge relation permanent until high water on December 18; shifting during remainder of year. Standard rating curve well defined below 4,000 second-feet and fairly well defined above. Gage read to hundredths twice daily during November, July, August, and September, and once daily during remainder of year. Slight diurnal fluctuation. Daily discharge ascertained by applying daily mean gage height to rating table; shifting-control method used December 19 to September 30. Records good.

COOPERATION.—Inter-County River Improvement Commission of King and Pierce counties furnished gage-height record and made some discharge measurements.

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Discharge measurements of Puyallup River at Alderton, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 9	L. D. Carson	0.98	535	Apr. 5	A. T. Brown	1.81	1,170
Dec. 3	Lasley Lee	1.54	869	May. 9	L. D. Carson	1.93	1,290
19	E. I. Anderson	7.19	12,900	June 24	Anderson and Roberts	2.47	1,830
Jan. 2	R. F. Bullard	4.70	6,600	Aug. 5	Carson and Bedford	2.98	1,140
Feb. 9	Brown and Bullard	2.91	2,350	Sept. 26	T. G. Bedford	2.45	682
Mar. 5	L. D. Carson	1.71	1,060				

NOTE.—Gage datum lowered 1.00 foot at noon, Aug. 5, 1918, before measurement made on that date.

Daily discharge, in second-feet, of Puyallup River at Alderton, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	895	550	895	12,400	2,110	1,040	1,430	1,340	1,430	1,520	1,700	1,110
2	830	528	798	6,690	2,110	1,040	1,340	1,340	1,340	1,520	1,600	1,040
3	895	575	830	6,690	2,330	1,110	1,260	1,600	1,180	1,520	1,260	965
4	895	1,110	1,800	4,260	2,330	1,110	1,180	2,110	1,180	1,340	1,110	895
5	830	765	895	5,200	4,410	1,040	1,180	1,700	1,600	1,340	1,110	895
6	830	735	798	4,410	3,380	965	1,040	1,520	2,000	1,340	1,110	965
7	765	650	735	6,010	3,520	965	1,040	1,260	2,330	1,340	1,180	965
8	765	575	678	5,040	2,700	895	1,040	1,260	2,330	1,430	1,180	895
9	830	550	650	4,560	2,330	895	1,180	1,260	2,220	1,700	1,040	965
10	830	505	705	2,330	3,240	895	1,520	1,180	2,830	1,700	1,180	965
11	798	528	600	3,660	4,110	965	1,340	1,110	2,570	1,340	1,180	965
12	895	550	1,430	6,520	3,100	895	1,260	1,110	2,330	1,180	895	965
13	705	575	6,350	4,880	2,570	830	1,260	1,180	2,830	1,180	1,040	1,040
14	735	550	12,200	4,110	2,220	830	1,180	1,180	2,330	1,340	1,040	965
15	765	505	5,680	4,260	2,000	895	1,180	1,340	1,900	1,600	1,180	965
16	735	485	4,560	3,960	1,800	895	1,110	1,260	1,700	1,900	1,040	965
17	550	430	6,860	3,660	1,800	965	1,110	1,430	1,700	2,220	798	965
18	550	448	15,900	5,360	1,700	1,260	1,040	1,340	1,600	2,330	1,110	830
19	528	448	15,900	3,900	1,520	1,180	965	1,430	1,700	1,900	1,180	895
20	550	528	11,000	3,380	1,520	1,040	1,110	1,600	1,700	1,430	830	965
21	528	678	6,860	3,100	1,340	1,040	1,520	1,600	1,800	1,180	895	765
22	528	735	10,600	2,830	1,430	1,340	1,700	1,340	2,220	1,260	1,110	678
23	528	705	8,430	2,960	1,260	1,800	1,520	1,260	2,110	1,260	1,430	650
24	528	600	6,180	2,960	1,260	2,330	1,430	1,180	1,800	1,180	1,430	600
25	600	528	5,200	3,380	1,180	2,570	1,340	1,180	1,700	1,260	1,260	600
26	735	550	4,720	2,960	1,340	2,830	1,180	1,110	1,600	1,520	1,180	678
27	600	650	10,800	2,960	1,180	2,000	1,180	1,180	1,700	1,260	965	678
28	625	600	12,900	2,700	1,110	1,800	1,180	1,110	1,520	1,260	1,040	798
29	600	625	13,500	3,100	.....	1,600	1,180	1,180	1,340	1,340	965	965
30	550	1,340	6,180	2,570	.....	1,600	1,200	1,340	1,340	1,520	1,260	1,040
31	505	.....	7,710	2,330	.....	1,600	.....	1,800	.....	1,520	1,180	.....

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Monthly discharge of Puyallup River at Alderton, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 410 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	895	505	694	1.69	1.95	42,700
November	1,340	430	620	1.51	1.68	36,900
December	15,900	600	5,880	14.3	16.49	362,000
January	12,400	2,330	4,300	10.5	12.11	264,000
February	4,410	1,110	2,180	5.32	5.54	121,000
March	2,830	830	1,300	3.17	3.66	79,900
April	1,700	965	1,240	3.02	3.37	73,800
May	2,110	1,110	1,350	3.29	3.79	83,000
June	2,830	1,180	1,860	4.54	5.06	111,000
July	2,330	1,180	1,480	3.61	4.16	91,000
August	1,700	798	1,140	2.78	3.20	70,100
September	1,110	600	888	2.17	2.42	52,800
The year	15,900	430	1,920	4.68	63.43	1,390,000

PUYALLUP RIVER AT PUYALLUP, WASH.

LOCATION.—In sec. 21, T. 20 N., R. 4 E., 1,000 feet upstream from Puget Sound Electric Railway bridge, 1 mile north of Puyallup, Pierce County, and 2 miles below mouth of Stuck River.

DRAINAGE AREA.—914 square miles (measured on drainage map published in Water-Supply Paper 313).

RECORDS AVAILABLE.—May 1, 1914, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by engineers of Inter-County River Improvement Commission and of U. S. Geological Survey.

DISCHARGE MEASUREMENTS.—Made from highway bridge three-quarters of a mile above gage.

CHANNEL AND CONTROL.—Bed of stream composed of light alluvial silt; shifting at all stages. Control formed by section of stream bed extending some distance downstream.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 34.15 feet at 4.45 p. m. December 18 (discharge, 40,500 second-feet); minimum stage, 17.36 feet at 8 p. m. November 18 (discharge, 726 second-feet).

1914–1918: Maximum and minimum stages given above.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Two hydroelectric plants, owned by Puget Sound Traction, Light & Power Co., divert water above station. Water for Electron plant is diverted from Puyallup River 10 miles above Electron into equalizing basin having capacity of 185 acre-feet; water used at this plant is returned directly to the river. Water for Dieringer plant is diverted from White River near Buckley into Lake Tapps (capacity, 51,000 acre-feet), and after use is discharged into Stuck River.

REGULATION.—See "Diversions."

ACCURACY.—Stage-discharge relation changed December 19 to March 10 and April 20 to May 20; constant at other times. Rating curves well defined below 30,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. For period of high water with marked range of stage during December, daily discharge was determined by averaging results obtained by applying mean

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gage heights for shorter intervals. Shifting-control method used December 19 to March 10, and April 20 to May 20. Records good.

COOPERATION.—Inter-County River Improvement Commission of King and Pierce counties furnished gage-height record and made some discharge measurements.

Discharge measurements of Puyallup River at Puyallup, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 12	L. D. Carson	18.42	1,540	Mar. 26	L. D. Carson	21.06	5,220
27	do	17.81	1,020	Apr. 8	A. T. Brown	19.13	2,230
Dec. 19	Carson and Bullard	28.87	25,200	19	L. D. Carson	19.23	2,300
26	Bullard and Webster	21.25	7,260	May 21	do	19.94	3,950
29	do	28.52	26,000	28	A. T. Brown	19.38	3,080
Jan. 8	L. D. Carson	22.23	9,280	June 24	Anderson and Roberts	20.56	5,080
10	do	21.08	6,450	July 12	L. D. Carson	18.76	2,240
Feb. 8	Bullard and Brown	20.77	5,260	Aug. 13	do	19.00	2,690
21	L. D. Carson	19.60	2,460	Sept. 15	Anderson and Baird	17.97	1,300
Mar. 11	A. T. Brown	18.90	2,030	25	T. G. Bedford	18.42	1,770

Daily discharge, in second-feet, of Puyallup River at Puyallup, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		1,390	1,620	20,000	4,300	1,970	3,550	3,240	3,980	2,160		1,900
2		1,390	1,220	13,800	4,040	2,080	3,310	3,550	3,270	2,220		1,900
3	1,630	1,740	1,390	11,000	3,790	1,860	3,240	4,040	2,100	2,100	2,670	2,220
4		1,860	1,810	10,500	5,200	2,080	2,790	4,830	1,900	1,840		2,030
5		1,710		8,690	7,610	1,970	2,720	4,300	2,360	2,030	2,160	2,100
6		1,570		8,030	7,190	1,970	2,450	3,710	2,980	2,100	2,160	2,100
7		1,480	1,460	9,350	6,770	1,970	2,140	3,390	4,060	2,100	2,220	2,100
8	1,540	1,390		8,910	5,200	1,970	2,200	3,310	5,540	3,050	2,220	1,660
9		1,390		7,400	4,470	1,920	2,650	3,160	4,880	3,340	2,220	2,030
10		1,390		6,370	6,520	1,620	3,470	2,860	6,120	3,420	2,160	2,160
11		1,100		7,190	7,610	2,200	3,310	2,720	5,920	a 2,860	1,900	2,160
12		1,200		9,810	5,970	1,980	3,240	2,450	5,730	2,290	1,960	2,100
13	1,450	1,480		8,030	4,830	1,810	3,080	2,650	6,320	2,290	2,160	2,220
14		1,480		7,400	4,300	1,760	2,650	2,720	5,730	2,980	2,160	2,160
15		1,440	10,200	6,980	3,880	1,660	2,720	2,720	4,780	3,120	2,220	1,440
16		1,340		6,770	3,710	1,660	2,650	2,580	3,810	3,890	2,100	1,900
17		1,300		6,570	3,470	1,340	2,580	2,940	4,230	3,810	1,900	2,030
18		930	35,600	8,030	3,890	1,970	2,380	2,310	3,980	4,880	1,660	1,900
19	1,340	1,040	28,100	6,770	2,940	2,260	2,260	3,710	4,590	3,890	2,290	1,960
20		1,040	14,600	5,770	2,520	2,140	2,380	3,960	4,500	2,700	2,100	2,160
21		1,070	10,200	5,580	2,320	2,020	2,940	3,810	4,970	2,490	1,900	1,900
22		1,140	16,100	5,200	2,140	2,940	4,040	3,570	5,540	2,490	2,160	a 1,870
23	1,440	1,140	13,200	5,200	2,380	3,710	3,960	3,420	5,160	2,490	2,490	a 1,840
24	1,440	1,070	8,920	5,580	2,580	4,650	3,790	3,500	4,880	2,490	2,630	a 1,800
25	1,440	870	6,570	5,970	2,650	5,770	3,470	3,340	4,590	2,420	2,360	1,770
26	1,480	1,000	7,560	5,390	2,260	5,200	3,160	2,840	4,230	2,420	2,490	1,660
27	1,390	1,000	16,300	5,200	2,140	4,220	2,940	2,980	4,410	2,360	2,220	1,660
28	1,100	1,070	21,400	5,580	2,020	3,710	2,580	2,980	4,060	2,360	1,960	1,780
29	1,260	930	27,000	5,770	.....	3,390	2,940	3,270	3,570	2,420	2,160	1,600
30	1,390	1,730	26,700	5,200	.....	3,790	3,080	3,730	1,960	2,400	2,220	2,030
31	1,440	.....	27,200	4,470	.....	3,630	.....	4,590	.....	2,400	2,290	.....

a Interpolated.

NOTE.—Braced figures show estimated mean discharge for periods when recorder did not operate. Discharge based on records at Buckley and Alderton.

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Discharge measurements of White River at Buckley, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 31	O. E. Osgood	24.06	3.1	Mar. 25	Osgood and Wolslegel	25.11	1,940
Dec. 30	G. L. Parker	28.89	11,100	Apr. 10	Osgood and Rhodes	24.47	1,130
30	do	28.75	10,400	25	do	24.64	1,260
31	do	28.14	9,040	May 10	do	24.22	879
Jan. 21	Lee and Osgood	25.02	1,870	25	do	24.74	1,390
22	Osgood and Lee	24.76	1,390	June 10	do	25.56	2,600
22	Lee and Osgood	25.18	2,070	26	do	25.01	1,790
Feb. 14	Osgood and Wolslegel	(a)	1,110	July 10	do	23.91	639
14	do	(a)	659	Sept. 25	Osgood and Rogers	(a)	2.7
25	do	(a)	138	25	do	(a)	2.9
Mar. 11	do	22.72	122				

[a] Correct gage height not available, as intake was clogged or water was below intake.

Daily discharge, in second-feet, of White River at Buckley, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	3.2	3.5	5.9	9,690		100	1,100	1,210	1,860	
2	3.5	3.5	5.9	6,320		163	963	1,320	1,260	
3	3.8	44	5.9	4,990		179	860	1,630	203	
4	3.5	80	7.7	4,650	1,500	144	698	1,950	185	70
5	3.8	78	6.2	4,110		150	600	1,750	381	
6	3.5	50	5.9	3,700		166	521	1,410	636	
7	3.8	11	5.6	4,430		163	435	1,220	1,320	460
8	3.8	10	5.6	4,000		160	344	1,130	2,740	840
9	3.8	10	5.9	3,030		141	772	1,030	2,170	774
10	3.8	9.7	5.9	2,500	1,800	141	1,100	884	2,590	806
11	3.8	9.7	21	3,140			1,060	811	2,500	394
12	3.3	9.3	48	4,540			1,020	722	2,420	268
13	2.8	8.9	3,190	3,600			967	665	2,760	390
14	2.5	8.5	9,170			100	868	542	2,500	992
15	3.0	7.3	3,910		1,050		790	445	1,820	932
16	3.0	5.3	2,640	2,600			744	434	1,560	706
17	3.0	5.6	4,960				692	724	1,640	752
18	2.5	5.6	17,900			278	634	1,050	1,660	998
19	2.2	5.0	10,000			318	570	1,540	2,040	556
20	2.2	3.8	5,400			270	665	1,630	2,060	285
21	2.2	4.7	3,670		450	258	1,190	1,560	2,250	653
22	2.2	4.1	7,220	1,800		656	1,570	1,460	2,420	163
23	2.5	3.8	5,320			832	1,480	1,460	2,340	276
24	3.0	4.1	3,350		967	1,320	1,420	1,520	2,090	257
25	3.0	4.7	2,380		420	1,980	1,260	1,420	1,990	140
26	3.5	5.0	2,700			1,380	1,090	1,350	1,860	
27	3.8	5.3	6,300		50	868	1,010	1,290	1,840	350
28	3.5	5.6	8,540	1,400		750	994	1,350	1,680	
29	3.5	6.2	12,400		.....	1,000	1,060	1,520	1,120	
30	3.5	7.3	11,200		.....	1,180	1,130	1,960	111	351
31	3.5	.....	8,380		.....	1,250	.....	2,090	.....	157

NOTE.—Braced figures show estimated mean discharge for periods indicated; during February, March, and July, discharge estimated from flow of adjacent stream, weather records, and approximate rating of dam at head of flume. Daily discharge not computed during August and September.

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Monthly discharge of White River and flume at Buckley, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 424 square miles.]

Month.	Discharge in second-feet.						Run-off (combined).	
	Maximum. (combined).	Minimum. (combined).	Mean.			Per square mile. (combined).	Inches.	Acre-feet.
			River	Flume	Combined.			
October	658	413	3.19	508	511	1.21	1.40	31,400
November	769	349	14.0	429	443	1.04	1.16	26,400
December	18,100	452	4,150	857	5,010	11.8	13.60	308,000
January	10,500	.....	3,020	696	3,720	8.77	10.11	229,000
February	.....	.....	1,070	674	1,740	4.10	4.27	96,600
March	2,220	.....	469	684	1,150	2.71	3.12	70,700
April	2,250	1,170	920	636	1,560	3.68	4.11	92,800
May	2,660	1,290	1,260	446	1,710	4.03	4.65	105,000
June	3,600	1,600	1,730	632	2,360	5.57	6.21	140,000
July	1,790	.....	418	906	1,320	3.11	3.58	81,200
August	.....	.....	50.0	860	910	2.15	2.48	56,000
September	.....	.....	10.0	672	682	1.61	1.80	40,600
The year	18,100	349	1,100	667	1,770	4.17	56.49	1,280,000

NOTE.—Monthly mean discharge at gaging station on river for August and September estimated by detailed study of flow of adjacent streams, weather records, and approximate rating of dam at headworks of White River flume.

WHITE RIVER FLUME AT BUCKLEY, WASH.

LOCATION.—In sec. 35, T. 20 N., R. 6 E., on left side of white River, 800 feet below intake, half a mile above Northern Pacific Railway crossing, and 1 mile northeast of Buckley, Pierce County.

RECORDS AVAILABLE.—January 18, 1913, to September 30, 1918.

GAGE.—Stevens long-distance water-stage recorder with transmitter at stilling well on right side of flume 800 feet below headgate, and recorder in gate house; installed January 12, 1918; inspected by O. E. Osgood. Prior to January 12, Fuller water-stage recorder at stilling well.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Control formed by long section of flume bottom below gage. A rock spill a quarter of a mile below gage is partial control also. Stage-discharge relation affected by variable quantity of rocks which work their way from intake to rock spill.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 6.15 feet at 8 a. m. June 7 (discharge, 2,000 second-feet); no flow in flume February 24, May 20–31, and June 1, and 20–28.

1913–1918: Maximum stage in 1918; flume dry at various times.

ICE.—Stage-discharge relation not affected by ice during year.

REGULATION.—Gates at intake operated frequently to control flow.

ACCURACY.—Stage-discharge relation affected by rocks washed into flume. Four well-defined rating curves used respectively, October 9 to December 19, December 20 to June 1, June 2 to September 22, and September 23 to 30. Shifting-control method used October 1 to 8. Operation of water-stage recorder excellent. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent.

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COOPERATION.—Puget Sound Traction, Light & Power Co. furnished gage-height record and made discharge measurements.

Flume diverts water from left bank of White River in the SE. ¼ sec. 35, T. 20 N., R. 6 E. Water is used for the development of power at Dieringer and is discharged into Stuck River.

Discharge measurements of White River flume at Buckley, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 9	O. E. Osgood	3.60	609	Mar. 11	Osgood and Wolslegel	3.25	607
31	do	2.78	405	25	do	1.78	244
Nov. 10	do	2.75	402	Apr. 10	Osgood and Rhodes	3.27	608
Jan. 21	Osgood and Lee	2.93	528	25	do	3.34	638
21	Lee and Osgood	.42	22.1	May 10	do	3.14	570
21	Osgood and Lee	.40	21.8	June 10	do	3.60	827
21	do	1.21	132	July 10	do	3.80	918
21	Lee and Osgood	3.50	696	25	Osgood and Eastman	3.96	1,000
22	Osgood and Lee	.78	62	Aug. 10	O. E. Osgood	3.94	973
22	Lee and Osgood	2.02	295	Sept. 10	do	3.12	727
Feb. 25	Osgood and Wolslegel	3.84	820	25	Osgood and Rogers	2.50	470

Daily discharge, in second-feet, of White River flume at Buckley, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	578	400	570	785	790	806	636	636	0	1,540	1,000	856
2	588	388	494	819	774	727	543	651	494	1,540	804	839
3	618	601	507	881	896	727	466	681	1,470	1,440	651	738
4	610	636	763	636	528	712	562	712	1,520	1,350	573	690
5	598	507	583	606	154	681	610	712	1,650	1,350	788	674
6	583	520	557	562	158	636	651	681	1,910	1,300	958	690
7	539	482	494	606	832	636	739	651	1,720	803	924	674
8	569	434	446	502	1,240	636	856	636	274	509	958	690
9	583	411	520	692	1,150	636	704	621	839	731	924	722
10	583	400	494	577	632	636	636	606	856	732	890	706
11	544	422	711	651	437	656	636	592	856	879	958	738
12	507	446	1,080	644	712	696	621	688	839	920	833	738
13	507	446	1,120	583	666	681	606	858	839	666	770	788
14	532	400	496	802	684	681	606	1,170	822	162	958	754
15	520	388	1,080	739	606	712	577	1,280	788	431	994	754
16	470	366	972	822	577	758	577	1,240	788	1,050	856	722
17	422	366	1,160	790	577	831	562	867	788	1,040	839	690
18	411	355	248	822	562	819	548	518	473	728	823	658
19	411	344	717	774	702	758	637	26	53	1,040	890	674
20	411	355	1,260	644	790	758	790	0	0	856	754	722
21	422	400	1,150	513	758	758	732	0	0	428	805	626
22	422	388	1,430	519	822	708	681	0	0	958	924	532
23	411	377	1,520	677	630	606	681	0	0	874	1,030	498
24	434	366	1,320	774	0	525	666	0	0	820	950	513
25	501	366	1,110	806	544	240	666	0	0	965	547	498
26	655	344	1,190	727	924	574	636	0	0	889	1,030	498
27	567	355	1,570	681	890	822	606	0	0	667	890	513
28	482	422	1,290	685	856	806	606	0	0	522	788	558
29	434	434	190	712	.....	698	621	0	492	1,050	805	618
30	422	762	366	729	.....	636	636	0	1,490	813	856	760
31	411	.....	1,150	806	.....	636	.....	0	.....	1,040	890	.....

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Monthly discharge of White River flume at Buckley, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	655	411	508	31,200
November	762	344	429	25,500
December	1,570	190	857	52,700
January	881	502	696	42,800
February	1,240	0	674	37,400
March	831	240	684	42,100
April	856	466	636	37,800
May	1,280	0	446	27,400
June	1,910	0	632	37,600
July	1,540	162	906	55,700
August	1,030	547	860	52,900
September	856	498	672	40,000
The year	1,910	0	667	483,000

DUWAMISH RIVER BASIN.

CEDAR RIVER AT CEDAR FALLS, WASH.

LOCATION.—In sec. 4, T. 22 N., R. 8 E., below Seattle municipal power plant at Cedar Falls, King County, and 3½ miles above Taylor Creek.

DRAINAGE AREA.—83 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 9, 1914, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank installed April 8, 1914, 0.7 mile below power plant; inspected by G. H. Moore.

DISCHARGE MEASUREMENTS.—Made from cable 90 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel; shifts during high water. No well-defined control. Banks high. One channel at all stages. Stage of zero flow, according to measurements made September 17, 1918, 3.0 feet ± 0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 11.4 feet at 9 a. m. December 19 (discharge, 6,290 second-feet); minimum stage from recorder, 3.32 feet at 4 p. m. November 25 (discharge, 0).

1914–1918: Maximum and minimum stages same as above.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Seattle municipal power plant diverts water direct from Cedar Lake through pressure pipe and returns it to river at plant. Practically entire low flow is carried through plant.

REGULATION.—Flow partly controlled by storage and release of water in Cedar Lake reservoir to accommodate requirements of power plant.

ACCURACY.—Stage-discharge relation changed December 13. Rating curves well defined; one used prior to shift not checked by measurement during period. Operation of water-stage recorder satisfactory except for periods, December 24–28, and July 14–28. Daily discharge ascertained by use of discharge integrator except for periods of defective gage-height record and for periods December 13–23 and December 29 to January 8, for which mean daily gage heights or mean gage heights for shorter intervals were applied to rating table. Records good October to December; excellent January to September.

COOPERATION.—Gage-height record and number of discharge measurements furnished by city engineer of Seattle.

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Discharge measurements of Cedar River at Cedar Falls, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 19	Moore and Scone	11.30	6,160	May 8	Benedict and Thom	5.77	623
Jan. 28	Parker and Benedict	6.32	890	9	J. E. Stewart	6.56	1,060
29	do	6.33	926	10	do	5.35	417
Apr. 26	Benedict and Thom	6.54	1,040	Sept. 17	Calkins and Parker	4.60	122
May 8	do	5.78	637				

Daily discharge, in second-feet, of Cedar River at Cedar Falls, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	181	159	158	4,340	615	358	652	372	556	349	83	158
2	186	181	52	3,110	539	353	610	900	484	355	101	138
3	197	176	168	2,160	480	323	510	587	489	353	94	155
4	168	123	213	1,860	532	354	383	342	460	294	81	133
5	170	187	174	1,900	693	349	425	557	412	339	83	126
6	165	199	231	1,860	916	355	475	674	351	306	95	124
7	142	190	190	1,950	1,040	343	322	631	386	296	85	123
8	127	178	209	1,900	993	345	412	923	504	330	83	123
9	136	213	235	1,580	867	348	365	1,110	516	335	65	123
10	133	215	219	1,220	965	290	445	390	648	328	84	119
11	135	136	280	1,100	1,110	334	490	365	654	326	94	124
12	132	184	293	1,430	1,020	340	375	191	634	327	74	123
13	136	151	793	1,510	871	338	499	295	620	240	60	123
14	108	166	4,640	1,330	741	339	307	311	585		73	123
15	137	154	4,460	1,150	652	348	525	348	519		85	123
16	130	181	3,110	960	582	345	357	398	416		105	123
17	132	157	3,060	930	478	305	606	470	427		106	123
18	140	61	5,480	1,200	473	343	349	507	410		95	123
19	175	140	5,900	1,080	432	349	493	519	379		123	123
20	145	150	3,950	912	397	350	569	594	362		170	123
21	170	121	2,380	808	385	356	571	573	352	145	166	123
22	138	135	2,430	704	362	362	594	535	340		167	106
23	139	133	2,780	656	373	370	902	497	309		170	126
24	146	124		890	315	346	356	468	349		168	123
25	158	43		1,270	357	381	735	442	350		164	123
26	198	113	2,050	1,160	365	380	830	372	351		162	117
27	164	122		940	364	376	371	414	342		162	113
28	125	142		898	360	361	301	394	348		158	110
29	162	104	5,710	890	.....	413	780	393	344	86	155	93
30	161	167	5,840	797	.....	539	754	430	305	93	154	113
31	191	.....	4,890	606	.....	553	.....	546	.....	81	154	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated from comparison with Landsberg records.

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Monthly discharge of Cedar River at Cedar Falls, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	198	108	152	9,350
November	215	43	150	8,930
December	5,900	52	2,200	135,000
January	4,340	656	1,390	85,500
February	1,110	315	617	34,300
March	553	290	363	22,300
April	902	301	512	30,500
May	1,110	191	502	30,900
June	654	305	440	26,200
July	355	81	213	13,100
August	170	60	117	7,190
September	158	93	123	7,320
The year	5,900	43	567	411,000

CEDAR RIVER NEAR LANDSBERG, WASH.

LOCATION.—In sec. 17, T. 22 N., R. 7 E., 1¾ miles above intake of Seattle water-supply system at Landsberg, 3 miles northeast of Ravensdale, King County, and about 5 miles below Taylor Creek.

DRAINAGE AREA.—135 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 30, 1914, to September 30, 1918. July 25, 1895, to September 30, 1898, at Clifford Bridge, 2 miles below present gage; March 24, 1901, to April 30, 1912, at intake of Seattle water-supply system, 1¾ miles below present gage. Early records not exactly comparable with those at present site because of a small difference in drainage area.

GAGE.—Stevens continuous water-stage recorder installed April 29, 1914; inspected by G. H. Moore.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of large boulders and gravel. Control formed by section of stream bed and by broad riffle about 1,200 feet below gage; shifting during high water. Logs may lodge on riffle. One channel at all stages. Stage of zero flow, according to measurements made August 27, 1916, about gage height 2.5 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 13.55 feet at 10 p. m. December 29 (discharge, 7,500 second-feet); minimum stage from water-stage recorder, 4.45 feet for part of each day November 21 and 25 (discharge, 191 second-feet).

1914–1918: Maximum stage same as above; minimum stage recorded, 4.35 feet at 1 a. m. October 15, 1914 (discharge, 162 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None above the station (see Cedar River at Cedar Falls, Wash.).

REGULATION.—Flow partly controlled by storage and release of water in Cedar Lake reservoir to accommodate requirements of Seattle municipal power plant.

ACCURACY.—Stage-discharge relation changed December 13. Rating curve used before change well defined; curve used after change well defined below 2,000 second-feet, but above, based on one discharge measurement at Cedar Falls, and estimated intervening inflow. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by use of discharge integrator except January 4–25 and September 12–16 and as indicated in footnote to table of daily discharge. Records excellent except during periods when recorder was out of order, for which they are good.

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COOPERATION.—Gage-height records and a number of discharge measurements furnished by city engineer of Seattle.

Discharge measurements of Cedar River near Landsberg, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	Moore and Beals	4.61	220	Mar. 10	J. E. Stewart	5.71	691
Jan. 29	Parker and Beals	7.38	1,600	Sept. 16	Parker and Calkins	4.51	260
30	do	7.18	1,490				

Daily discharge, in second-feet, of Cedar River near Landsberg, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1			409	5,020	1,220	810	1,060	680	840	515		306
2			306	3,660	1,140	786	1,030	965	760	520	260	293
3	389		394	2,800	1,130	770	910	1,130	750	563		294
4			605	2,460	1,230	762	761	666	720	468	245	288
5		350	475	2,460	1,490	760	758	800	670	510	239	278
6	326		550	2,460	1,710	754	842	979	600	479	245	275
7	314		455	2,600	1,819	746	670	965	613	475	248	269
8	274	320	457	2,530	1,700	734	755	1,170	727	502	242	273
9	293	359	595	2,320	1,550	735	745	1,540	740	523	260	273
10	282	379	546	2,110	1,850	689	815	732	899	524	262	274
11	292	313	642	1,980	1,980	718	828	654	900	520	297	277
12	283	332	705	2,250	1,780	720	765	442	859	508	290	272
13	283	317	1,670	2,250	1,590	707	863	571	852	449	259	267
14	266	328	6,020	2,180	1,410	704	736	596	799	330	246	264
15	281	313	5,540	2,110	1,290	705	887	633	727	313	264	262
16	281	332	3,840	1,969	1,260	702	792	744	621	386	282	262
17	279	316	3,780	1,920	1,160	675	998	793	625	324	290	258
18	276	238		2,110		715	770	851	665	396	297	260
19	321	276		1,980		715	800	879	576	353	384	258
20		289		1,860		743	980	965	546	375	399	257
21		270		1,800	930	744	1,040	915	535	306	365	255
22		278	3,450	1,689		828	906	852	517	283	404	247
23		278		1,620		830	1,370	812	489	303	415	255
24		265		1,800		996	735	789	511	308	384	253
25	305	223		2,110		1,020	1,000	745	520	297	363	253
26		244		1,940	812	941	1,460	668	520	274	345	246
27		263		1,850	787	895	693	664	510	264	343	242
28		331	4,930	1,830	786	861	601	677	510		338	238
29		298	6,820	1,660	.....	858	880	670	504	280	321	229
30		486	6,620	1,470	.....	970	1,260	705	472		320	240
31		.....	5,660	1,330	.....	979	.....	815	.....		319	.....

NOTE.—Braced figures show estimated mean discharge for periods indicated, during which time recorder did not operate satisfactorily; discharge estimated from record of precipitation and comparison with record at Cedar Falls, except for period Dec. 18-27 when comparison was made with record at Landsberg dam. Discharge estimated for few days during year.

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Monthly discharge of Cedar River near Landsberg, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	266	313	19,200
November	486	223	317	18,900
December	.....	306	2,760	170,000
January	5,020	1,320	2,200	135,000
February	1,930	785	1,250	69,400
March	1,020	675	792	48,700
April	1,400	601	887	52,800
May	1,540	442	810	49,800
June	900	472	650	38,700
July	524	.....	389	23,900
August	415	239	304	18,700
September	306	229	264	15,700
The year	.....	223	912	661,000

SNOHOMISH RIVER BASIN.

SOUTH FORK OF SKYKOMISH RIVER NEAR INDEX, WASH.

LOCATION.—In NE. ¼ sec. 29, T. 27 N., R. 10 E., 300 feet above Sunset Falls and 2 miles above town of Index and mouth of North Fork, Snohomish County.

DRAINAGE AREA.—351 square miles (measured on topographic and county maps).

RECORDS AVAILABLE.—October 7, 1902, to September 30, 1905; April 26, 1911, to October 21, 1912; June 14, 1913, to September 30, 1918.

GAGE.—Inclined and vertical staff gage on right bank; installed April 19, 1914; read by C. A. McFarland. October 7, 1902, to September 30, 1905, vertical staff at site of present gage but at datum 0.39 foot higher. April 26, 1911, to February 25, 1914, vertical staff at site of present gage but at datum 1.00 foot higher.

DISCHARGE MEASUREMENTS.—Made from cable or by wading 1 mile below gage or from bridge 100 feet below.

CHANNEL AND CONTROL.—Bed at measuring section composed of gravel and small boulders. Sunset Falls, 300 feet below gage, forms rock control; changed by blasting at falls in July, 1914, and by shifting of channel above, during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 22.6 feet at 9 a. m. December 18 (discharge, 47,000 second-feet); minimum stage recorded, 0.97 foot September 26 (discharge, 346 second-feet).

1902–1905, 1911–1918: Maximum stage same as above; minimum stage recorded, 0.54 foot September 30, 1915 (discharge, 262 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 18 during flood. Rating curve used October 1 to December 17, well defined; curve used December 18 to September 30 well defined below 12,000 second-feet, but somewhat uncertain above. Gage read once daily to quarter-tenths at medium and high stages, and to hundredths at low stages; read several times a day at extremely high stages. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

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Discharge measurements of South Fork of Skykomish River near Index, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	McCombs and Carson..	2.16	753	June 1	L. D. Carson.....	5.93	3,940
Jan. 14	T. R. Newell.....	5.60	3,440	5	.....do.....	6.48	4,550
16	.....do.....	5.24	3,110	6	.....do.....	7.61	6,180
Feb. 14	L. D. Carson.....	4.03	1,970	Sept. 20	Parker and Calkins.....	1.20	420
June 1	.....do.....	6.09	4,040	21	G. L. Parker.....	1.15	400

Daily discharge, in second-feet, of South Fork of Skykomish River near Index, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	656	772	1,320	18,100	1,500	920	2,740	3,940	4,060	2,640	920	600
2	722	694	1,210	10,400	1,640	930	2,190	4,700	3,250	2,460	1,130	560
3	1,110	1,500	1,110	8,040	1,640	920	1,940	5,550	2,840	2,190	970	560
4	852	2,180	1,860	8,220	2,100	920	1,780	7,320	3,140	1,940	920	520
5	772	1,640	1,320	9,000	4,440	820	1,710	5,850	4,440	2,100	775	520
6	694	1,780	1,440	7,860	4,180	820	1,570	4,180	6,160	2,020	820	483
7	584	1,320	1,160	7,860	4,700	775	1,780	3,470	7,150	2,020	775	483
8	550	1,110	1,070	6,320	3,250	775	2,020	3,250	6,810	1,940	720	483
9	550	936	1,440	4,980	2,460	730	3,250	3,040	8,040	2,020	1,020	483
10	518	852	1,500	3,940	3,250	730	3,820	2,740	7,680	2,280	1,940	483
11	488	812	4,020	3,700	4,060	730	2,740	2,740	6,480	1,860	1,710	483
12	460	812	6,000	4,980	3,140	730	1,500	3,250	7,680	1,640	1,250	483
13	460	852	16,000	3,580	2,460	730	2,740	3,700	7,150	1,570	1,070	483
14	446	772	17,400	3,470	2,020	685	2,460	3,700	5,550	1,570	920	449
15	432	694	10,200	3,140	2,100	730	2,100	3,360	4,180	1,570	920	449
16	460	656	18,400	3,040	2,460	820	2,020	3,250	5,400	1,780	920	449
17	460	620	15,400	3,940	1,800	970	2,190	3,140	4,700	1,640	920	417
18	432	584	40,300	5,850	1,370	1,710	2,020	3,250	3,820	1,640	1,020	417
19	432	550	18,300	4,570	1,250	1,430	2,100	2,840	3,820	1,570	1,570	417
20	432	584	9,800	3,250	1,130	1,710	3,140	3,250	4,060	1,310	1,130	417
21	432	1,640	7,860	2,640	1,070	1,780	4,440	2,840	4,700	1,250	1,090	417
22	460	1,110	16,500	2,280	1,020	4,310	4,980	2,840	4,700	1,130	870	387
23	432	936	8,230	2,280	1,070	3,470	4,440	2,460	4,700	1,250	1,020	359
24	518	812	6,320	5,850	970	4,300	4,440	2,370	4,180	1,070	920	359
25	584	894	4,440	4,180	970	5,120	3,580	2,100	3,700	1,020	870	359
26	1,110	772	4,980	3,040	920	3,700	3,140	2,100	3,360	1,130	820	346
27	1,110	772	20,500	2,550	970	2,740	3,040	2,460	3,000	1,250	775	359
28	936	1,440	26,200	2,740	920	2,550	3,250	2,640	2,640	1,130	685	359
29	694	1,110	36,800	2,940	.....	3,250	3,700	3,700	2,550	1,020	640	387
30	656	1,570	20,500	2,370	.....	1,640	4,180	6,980	2,460	970	685	417
31	620	.....	20,500	1,780	.....	3,360	.....	5,550	.....	920	640	.....

NOTE.—Gage not read, discharge interpolated, Oct. 14, Mar. 24, June 27, and Sept. 10.

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Monthly discharge of South Fork of Skykomish River near Index, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 351 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	1,110	432	615	1.75	2.02	37,800
November	2,180	550	1,030	2.93	3.27	61,300
December	40,300	1,070	11,000	31.3	36.09	676,000
January	18,100	1,780	5,060	14.4	16.60	311,000
February	4,440	920	2,090	5.95	6.20	116,000
March	5,120	730	1,770	5.04	5.81	109,000
April	4,980	1,500	2,830	8.06	8.99	168,000
May	7,320	2,100	3,630	10.3	11.87	223,000
June	8,040	2,460	4,750	13.5	15.06	283,000
July	2,640	920	1,610	4.59	5.29	99,000
August	1,940	640	980	2.79	3.22	60,300
September	600	346	446	1.27	1.42	26,500
The year	40,300	346	3,000	8.55	115.84	2,170,000

MILLER CREEK AT MILLER RIVER, WASH.

LOCATION.—In NE. ¼ sec. 33, T. 26 N., R. 11 E., 1½ miles south of Miller River (formerly Berlin) and mouth of creek, King County.

DRAINAGE AREA.—44.2 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 24, 1911, to September 30, 1918, (fragmentary).

GAGE.—Inclined staff on left bank, installed August 27, 1914; read by E. J. Moore. May 24, 1911, to August 26, 1914, vertical staff 10 feet upstream from present gage at same datum.

DISCHARGE MEASUREMENTS.—Made from cable 900 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of large boulders and gravel; shifting during high water. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year, occurred during flood of December 18, estimated by observer at 7 or 8 feet (discharge not computed); minimum stage recorded, 1.02 feet September 22 and 24 (discharge, 29 second-feet).

1911–1918: Maximum stage same as above; minimum stage recorded, 0.07 foot August 31, 1915 (discharge, 24 second feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during flood on December 18. Rating curve used prior to that date well defined below 2,000 second-feet; curve used for remainder of year well defined below 1,000 second-feet. Gage read to hundredths when ranger visited station. Daily discharge ascertained by applying gage height to rating table. Records good for days when gage was read. Discharge for days when gage was not read has not been estimated.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Miller Creek at Miller River, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 31	Carson and McCombs	0.73	102	June 4	L. D. Carson	2.91	432
Feb. 3	T. R. Newell	2.09	172	8	do	3.76	8[illegible]2
Apr. 26	do	2.82	389	Sept. 22	Parker and Lee	1.02	29.1
June 3	L. D. Carson	2.68	334	22	Lee and Parker	1.02	29.2

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Daily discharge, in second-feet, of Miller Creek near Miller River, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1										88	56
2				163	132	236				152	50
3				172				844	310	107	50
4					123	222	1,120	420		86	
5				236	112					82	
6	60			660						72	42
7					87					65	42
8				484	74			909	264	62	42
9	58							909		210	
10	59							1,050		441	39
11				441			842	909		327	
12	56				67	186		979		210	34
13		3,830		278				1,050		163	
14				222	70			748	152	128	34
15		1,280				197	778	531			
16				210	78			507	249		34
17		1,180						688			
18				210	84	249		484			
19								531			
20					123			606		210	30
21				186				688			
22								717			29
23			222	174	132		660	660			
24			531					555		132	29
25				210	132			484		132	
26			441			389		462		132	
27					132	420		400			
28			420		344			381			
29							606			73	
30			249							69	
31									100	65	

NOTE.—No gage-height record for days for which no discharge is given.

NORTH FORK OF SKYKOMISH RIVER AT INDEX, WASH.

LOCATION.—In SE. ¼ sec. 17, T. 27 N., R. 10 E., at Index, Snohomish County, 1¾ miles above mouth of river.

DRAINAGE AREA.—143 square miles (measured on topographic and county maps).

RECORDS AVAILABLE.—August 24, 1910, to September 30, 1918.

GAGE.—Vertical and inclined staff on right bank, one-third mile above highway bridge, installed February 1, 1918, at datum of previous gage; read by Lee Pickett. August 24 to September 2, 1910, vertical staff on left bank 100 feet above tramway bridge; destroyed in course of improvements to channel; October 26, 1910, to November 26, 1911, vertical staff on right bank at lower end of wing dam and about 100 feet below site of present gage. November 27, 1911, to December 29, 1917, vertical staff on wing dam on right bank about 200 feet upstream from present site; destroyed by flood. January 13–31, 1918, readings from a reference point at site of present gage.

DISCHARGE MEASUREMENTS.—Made from cable or by wading. Prior to flood of December, 1917, cable 600 feet below gage; reinstalled 200 feet above new gage.

CHANNEL AND CONTROL.—Bed of stream composed of gravel and large boulders; shifting during high water; no well-defined control; right bank high, not subject to overflow; left bank slopes back gradually. Stage of zero flow, according to measurements made September 21, 1918, gage height −1.3 feet ±0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.0 feet at 5 a. m. December 29 (discharge, 17,800 second-feet); minimum stage recorded, 0.50 foot September 28 (discharge, 143 second-feet).

1911–1918: Maximum stage same as above; minimum stage recorded, 0.45 foot at 1 p. m. September 29, 1915 (discharge, 97 second-feet).

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ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—A measured diversion of 2 second-feet was being made 400 feet above the station on May 2, 1918.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 29. Rating curves well defined below 8,000 second-feet; extended above. Staff gage read once daily to quarter-tenths at low stages and to tenths at high stages. During periods of rapidly changing stage, gage read several times a day. Slight diurnal fluctuation during the summer. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of North Fork of Skykomish River at Index, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	McCombs and Carson..	1.66	510	June 7	L. D. Carson.....	3.43	3,040
2	L. D. Carson.....	1.58	481	July 7	.....do.....	1.99	1,140
May 2	T. R. Newell.....	2.86	2,100	Sept. 21	Calkins and Parker.....	.63	178
June 2	L. D. Carson.....	2.20	1,410	21	Lee and Calkins.....	.62	190
3	.....do.....	2.16	1,330	23	Lasley Lee.....	.58	174
5	.....do.....	3.12	2,720				

Daily discharge, in second-feet, of North Fork of Skykomish River at Index, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	316	506	673		674	354	1,170	2,070	1,820	1,220	425	309
2	829	483	673		635	354	1,020	2,200	1,370	1,220	756	309
3	723	1,440	673		635	365	884	3,330	1,370	1,220	490	299
4	529	1,140	673		1,820	365	797	3,690	1,820	a1,220	458	258
5	438	1,000	624		1,820	365	797	2,070	2,490	1,220	354	258
6	354	885	624	2,650	1,820	309	714	1,700	3,330	1,170	337	258
7	354	829	576		1,940	299	756	1,700	3,150	1,170	354	249
8	280	673	506		1,590	284	1,070	1,590	3,150	1,120	425	249
9	280	624	775		674	268	1,590	1,370	3,690	1,170	1,170	236
10	247	576	775		1,120	258	1,700	1,370	5,050	1,370	1,370	236
11	247	483	1,970		1,590	249	1,590	1,590	4,070	884	840	222
12	247	506	1,070		1,120	249	1,590	1,590	3,690	797	635	222
13	232	416	6,870	1,480	930	249	1,220	1,820	3,510	840	598	222
14	202	354	10,800	1,270	797	249	1,270	1,820	2,490	975	1,320	222
15	202	354	5,490	975	674	249	1,590	1,590	1,940	1,020	884	222
16	298	316	4,070	1,170	635	249	1,270	1,590	2,490	975	797	222
17	232	316	6,870	1,590	525	395	1,020	1,590	2,340	975	635	213
18	187	280	13,800	2,490	490	714	840	1,590	2,070	884	635	194
19	187	280	4,220	2,200	490	598	1,700	1,370	2,070	797	598	194
20	187	576	3,090	2,070	425	635	2,070	1,870	2,810	756	560	194
21	187	576	3,920	2,070	425	674	2,980	1,270	3,880	635	560	186
22	a 187	576	2,380	1,820	413	756	2,070	1,220	2,980	560	560	175
23	187	576	2,600	1,700	413	1,370	2,070	1,270	2,340	560	560	169
24	416	576	2,170	2,340	395	1,590	1,940	1,170	2,070	560	525	159
25	483	1,000	2,070	1,590	365	2,490	1,590	1,070	1,940	490	1,170	159
26	216	885	5,830	1,370	425	1,270	1,480	1,070	2,070	635	425	149
27	298	885	9,050	975	354	1,270	1,590	1,370	1,590	635	413	149
28	395	775	11,000	930	354	1,270	1,590	1,370	1,370	560	365	143
29	416	576	16,600	1,120	.....	1,170	2,070	2,070	1,270	490	337	159
30	395	775	8,700	884	.....	1,590	1,940	3,150	1,270	490	320	153
31	374	.....		674	.....	1,590	.....	2,070	.....	425	320	.....

a Interpolated.

NOTE.—Braced figures show mean discharge for periods indicated; based on comparison with flow of Middle Fork of Snogualmie River near North Bend.

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Monthly discharge of North Fork of Skykomish River at Index, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 143 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	829	187	327	2.29	2.64	20,100
November	1,440	280	641	4.48	5.00	38,100
December	16,600	506	4,450	31.1	35.85	274,000
January	.....	674	1,950	13.6	15.68	120,000
February	1,940	354	841	5.88	6.12	46,700
March	2,490	249	713	4.99	5.75	43,800
April	2,980	714	1,470	10.3	11.49	87,500
May	3,690	1,070	1,750	12.2	14.07	108,000
June	5,050	1,270	2,520	17.6	19.64	150,000
July	1,220	425	872	6.10	7.03	53,600
August	1,370	320	621	4.34	5.00	38,200
September	300	143	214	1.50	1.67	12,700
The year	16,600	143	1,370	9.58	129.94	993,000

SULTAN RIVER NEAR SULTAN, WASH.

LOCATION.—In sec. 8, T. 28 N., R. 8 E., at Horseshoe Bend, 4½ miles north of Sultan and mouth of river, Snohomish County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 18, 1911, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank a quarter of a mile above Horseshoe Bend; inspected by city engineer of Everett. Prior to October 29, 1915, Lietz water-stage recorder at Camp Habecker 1½ miles upstream.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—In canyon; control formed by large rocks, boulders, and heavy gravel; not likely to change except at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.6 feet at about 9 a. m. December 18 (from high-water mark in well; discharge, 20,600 second-feet); minimum stage from water-stage recorder, 0.61 foot at 7 p. m. September 29 (discharge, 77 second-feet).

1911–1918: Maximum stage same as above; minimum stage recorded, 4.52 feet at Camp Habecker September 29, 1915 (discharge, 71 second-feet).

ICE.—Stage-discharge relation seldom affected by ice. Water in stilling well freezes during very cold weather. No ice during current year.

DIVERSION.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation affected by backwater from drift on control October 1 to December 13. Drift removed and stage-discharge relation changed on December 13 by high water. Rating curve for period October 1 to December 13 well defined below and poorly defined above 500 second-feet; curve for remainder of year well defined throughout. Operation of water-stage recorder satisfactory except for periods indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent except for a few days in November and December when amount of backwater effect is uncertain.

COOPERATION.—Gage-height record furnished by city engineer of Everett, Wash.

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Discharge measurements of Sultan River near Sultan, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 20	Newell and Calkins	4.96	1,680	Jan. 15	T. R. Newell	4.27	1,230
29	Carson and Calkins	13.75	15,100	May 7	Stewart and Calkins	3.48	777
30	do	7.44	4,490	8	do	3.25	657
31	do	9.93	8,120	Sept. 19	Calkins and Parker	.79	91

Daily discharge, in second-feet, of Sultan River near Sultan, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	228	254	570	5,060		274	943	863	812	382	162	164
2	512	312	472	2,160		255	718	1,090	695	354	286	156
3	622	1,750	642	2,410	1,480	247	570	1,400	590	315	198	147
4	396	1,710	1,210	3,760		227	514	1,540	674	298	164	138
5	292	1,090	659	3,700		212	495	1,090	972	315	147	131
6	238	825	781	3,190	2,580	198	460	787	1,240	283	136	125
7	210	570	553	2,640	1,540	188	332	764	1,340	285	131	122
8	182	442	526	2,040	1,210	180	889	718	1,150	304	143	118
9	166	354	1,420	1,440	1,500	176	1,940	610	1,210	328	237	114
10	153	304	916	1,000	3,190	174	1,620	590	1,580	412	1,660	112
11	142	270	2,480	1,120	1,620	171	1,180	631	1,240	315	1,090	110
12	136	259	1,590	2,120	1,180	187	1,030	695	1,210	245	551	108
13	129	250	8,370	1,409	857	179	889	740	1,180	222	354	106
14	123	228	14,100	1,120	631	174	718	610	787	231	283	104
15	120	210	a13,900	1,180	514	202	674	610	590	255	340	102
16	121	193	a8,300	1,700		262	863	787	610	277	340	99
17	134	179	4,740	1,760		386	943	764	695	221	283	97
18	131	168	a15,600	2,690	350	1,220	674	1,240	495	277	635	94
19	125	157	a5,600	1,580		674	887	1,210	551	253	764	92
20	121	228	1,780	1,030		718	1,440	1,700	652	237	444	91
21	134	864	1,200	787	257	1,040	1,660	1,180	787	264	340	90
22	131	457	5,040	652	247	2,250	1,400	889	764	205	551	90
23	122	328	1,940		228	1,240	1,660	863	718	182	652	93
24	241	261	1,150		253	3,670	1,090	695	551	174	444	90
25	605	328	863		247	2,910	863	590	444	177	328	87
26	752	270	2,130	1,330	292	1,510	740	570	427	328	283	84
27	698	400	10,100		245	1,090	718	590	427	292	247	82
28	481	760	8,280		227	1,000	787	740	367	231	220	81
29	340	520	13,000		.....	1,090	916	1,000	304	198	202	79
30	292	718	4,310		.....	1,480	943	1,180	354	180	183	88
31	281	.....	6,800		.....	1,300	.....	1,180	.....	166	172	.....

a Estimated.

NOTE.—Braced figures show mean discharge for periods indicated, as based on comparison with flow of neighboring streams.

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Monthly discharge of Sultan River near Sultan, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	752	129	270	16,600
November	1,750	157	493	29,300
December	15,600	472	4,500	277,000
January	5,060	.....	1,820	112,000
February	3,190	237	929	51,600
March	3,670	171	803	49,400
April	1,940	480	868	55,800
May	1,700	570	900	55,300
June	1,580	304	781	46,500
July	412	166	266	16,400
August	1,660	131	386	23,700
September	164	79	106	6,310
The year	15,600	79	1,020	740,000

MIDDLE FORK OF SNOQUALMIE RIVER NEAR NORTH BEND, WASH.

LOCATION.—In NE. ¼ SE. ¼ sec. 10, T. 23 N., R. 8 E., 1 mile southeast of North Bend, King County, and 2¾ miles above junction with North Fork.

DRAINAGE AREA.—184 square miles (measured on topographic and county maps).

RECORDS AVAILABLE.—August 10, 1907, to February 29, 1908; August 25, 1908, to September 30, 1918. All records prior to October 1, 1915, published in Water-Supply Paper 412.

GAGE.—Stevens continuous water-stage recorder on left bank; installed August 7, 1915; inspected by E. H. Robinson. Prior to August 7, 1915, gage was at highway bridge 2¼ miles below present site.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge at original station.

CHANNEL AND CONTROL.—Bed composed of large boulders. Control shifts at extremely high water. Left bank high; right bank low and heavily wooded. Stage of zero flow, according to measurements made September 15, 1918, at gage height −0.8 ±0.3 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.16 feet at 10 a. m. December 18 (discharge, 18,300 second-feet); minimum stage recorded, 1.53 feet at 7 p. m. September 27 (discharge, 182 second-feet).

1907–1918: Maximum stage same as above; minimum stage recorded, 1.50 feet at 1 p. m. September 30, 1915 (discharge, 146 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 18. Rating curves well defined below 7,000 second-feet; extended above. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records prior to high water in December, excellent; for periods when discharge was estimated, fair; for remainder of year good.

COOPERATION.—Puget Sound Traction, Light & Power Co. furnished gage-height record and made some discharge measurements.

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Discharge measurements of Middle Fork of Snoqualmie River near North Bend, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	E. H. Robinson	1.81	220	Jan. 3	Parker and Robinson	5.03	3,490
23	do	1.77	201	Sept. 14	Parker and Calkins	1.78	251
Jan. 2	G. L. Parker	5.26	3,810	15	Calkins and Parker	1.76	243

Daily discharge, in second-feet, of Middle Fork of Snoqualmie River near North Bend, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	394	450	1,060	6,870	1,090	681	1,490	1,820	1,820	1,170	466	400
2	492	440	864	3,930	970	675	1,260	2,230	1,440	1,170	713	375
3	708	1,350	936	3,710	977	637	1,050	2,750	1,300	1,050	509	366
4	524	1,860	1,500	4,110	1,830	607	970	3,320	1,490	930	429	326
5	412	1,130	1,020	4,380	3,230	554	915	2,430	2,300	970	385	302
6	359	1,060	1,130	3,750	3,060	537	876	1,820	3,150	915	366	298
7	311	808	885	4,200	3,150	498	922	1,540	3,490	899	357	290
8	286	658	747	3,400	2,160	471	1,130	1,540	3,150	930	395	283
9	272	557	1,260	2,520	1,710	445	1,820	1,340	3,230	970	986	280
10	256	481	1,060	1,880	3,880	424	2,080	1,210	3,750	1,050	1,920	276
11	246	445	2,670	2,230	3,050		1,760	1,260	3,150	853	1,710	265
12	234	455	2,540	4,140			1,540	1,490	3,150	713	1,090	259
13	228	529	10,900	3,060			1,390	1,710	3,400	655	810	256
14	219	455	10,800	2,380			1,260	1,650	2,520	675	681	253
15	216	407	5,600	2,300	1,100	500	1,210	1,490	1,760	747	713	244
16	222	364	6,520	2,080			1,260	1,880	1,710	846	747	244
17	225	343	5,850	2,380			1,440	1,650	1,950	846	694	235
18	213	315	15,400	3,900			1,210	1,820	1,540	803	823	229
19	208	301	7,310	2,600			1,340	1,820	1,600	733	1,460	223
20	202	304	3,940	1,880			1,950	1,950	1,820	613	1,050	221
21	208	1,030	2,660	1,490	650		2,680	1,540	2,080	681	817	221
22	225	836	6,800	1,300			2,680	1,340	2,160	595	970	212
23	208	603	3,760	1,260		1,800	2,230	1,300	2,080	543	1,010	207
24	337	491	2,300	4,420	554		2,160	1,210	1,760	531	824	199
25	713	518	1,710	3,230	543		1,650	1,090	1,600	498	681	192
26	836	455	2,840	2,020	767		1,440	1,090	1,490	607	625	186
27	812	488	10,300	1,600	668	1,440	1,390	1,090	1,390	625	572	184
28	640	1,040	11,300	1,760	612	1,390	1,490	1,340	1,260	537	514	186
29	476	808	15,400	1,820	.....	1,440	1,760	1,950	1,090	498	466	192
30	417	2,120	7,710	1,440	.....	1,820	1,880	2,680	1,130	471	440	210
31	394	.....	8,700	1,170	.....	1,790	.....	2,880	.....	446	424	.....

NOTE.—Braced figures show estimated mean discharge for periods indicated, based on flow of North and South forks near North Bend.

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Monthly discharge of Middle Fork of Snoqualmie River near North Bend, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 184 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	836	202	371	2.02	2.33	22,800
November	2,120	301	703	3.82	4.26	41,800
December	15,400	747	5,020	27.3	31.47	309,000
January	6,870	1,170	2,810	15.3	17.64	173,000
February	3,880	543	1,380	7.50	7.81	76,600
March	.....	.....	1,060	5.60	6.46	63,300
April	2,680	876	1,540	8.37	9.34	91,600
May	3,320	1,090	1,750	9.51	10.96	108,000
June	3,750	1,090	2,120	11.60	12.94	127,000
July	1,170	445	760	4.13	4.76	46,700
August	1,930	357	763	4.15	4.78	46,900
September	400	184	254	1.38	1.54	15,100
The year	15,400	184	1,550	8.42	114.29	1,120,000

NORTH FORK OF SNOQUALMIE RIVER NEAR NORTH BEND, WASH.

LOCATION.—In NE. ¼ sec. 26, T. 24 N., R. 8 E., at Gabriel ranch, 2½ miles above mouth and 3½ miles northeast of North Bend, King County.

DRAINAGE AREA.—Approximately 102 square miles (measured on topographic and county maps).

RECORDS AVAILABLE.—July 4, 1907, to September 30, 1918. All records prior to October 1, 1915, published in Water-Supply Paper 412.

GAGE.—Friez water-stage recorder on right bank 200 yards southeast of ranch house, installed September 26, 1916; inspected by E. H. Robinson. Previous gages as follows: July 21, 1907, to September 2, 1912, vertical staff at highway bridge one-eighth mile above mouth; September 2, 1912, to September 26, 1916, Fuller and Friez water-stage recorders at same site and datum.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 200 yards above mouth.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; shifting at extremely high stages. No well-defined control. Right bank not subject to overflow; left bank fairly high, not subject to overflow except at extremely high stages. Stage of zero flow, according to measurements made September 14, 1918, gage height −0.4 ±0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.80 feet at 7.30 a. m. December 18 (discharge, 9,890 second-feet); minimum stage recorded, 1.64 feet September 27 (discharge, 76 second-feet).

1907–1918: Maximum stage determined by leveling to high-water mark, 14.5 feet November 18, 1911 (discharge, 11,100 second-feet); water above gage November 18, 19, 23, 24, 29, and 30, 1909, and stage may have exceeded that reached in 1911. Minimum stage recorded, 1.0 foot September 26–28, 1910 (discharge, 56 second feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 18. Rating curves well defined below 4,000 second-feet; extended above. Operation of water-stage recorder excellent except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph or, for days of considerable

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variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Partial clogging of intake pipe caused lag of water stage in well behind that in river. This caused slight uncertainty in daily records for periods of rapidly changing stage, but had little or no effect on monthly records. Records good.

COOPERATION.—Puget Sound Traction, Light & Power Co. furnished gage-height record and made some discharge measurements.

Discharge measurements of North Fork of Snoqualmie River near North Bend, Wash. during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height (river gage).	Discharge.	Date.	Made by—	Gage height (river gage).	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	E. H. Robinson	1.92	107	Jan. 20	E. H. Robinson	3.98	1,120
22	do	2.00	121	Sept. 14	Calkins and Parker	1.84	109
Jan. 2	G. L. Parker	4.80	1,980	18	Parker and Calkins	1.79	98
3	do	4.98	2,180				

Daily discharge, in second-feet, of North Fork of Snoqualmie River near North Bend, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	205	211	658	3,590	623	342	900	875	818	307	153	199
2	254	242	520	2,380	571	336	710	1,040	659	302	284	183
3	316	756	505	2,060	558	324	590	1,310	584	271	229	170
4	238	1,110	884	2,950	1,130	316	522	1,510	652	252	195	163
5	196	726	654	2,340	1,940	302	478	1,120	925	245	181	155
6	169	704	648	1,940	1,880	288	443	866	1,210	229	168	146
7	148	530	540	2,280	1,880	268	452	770	1,310	222	157	140
8	136	413	476	1,880	1,260	268	604	810	1,160	216	166	136
9	125	339	900	1,410	1,040	260	1,210	695	1,210	216	392	134
10	119	291	744	1,090	2,540	258	1,160	622	1,410	234	1,000	128
11	113	267	1,480	1,410	1,720	252	951	659	1,160	224	1,510	124
12	107	258	1,540	2,220	1,260	247	850	763	1,160	204	534	118
13	103	271	6,230	1,660	977	239	778	810	1,160	186	378	113
14	100	246	5,830	1,360	794	234	680	710	886	190	322	111
15	98	223	2,990	1,210	680	242	617	666	656	177	330	107
16	115	205	3,910	1,160	590	266	604	1,020	659	186	336	104
17	130	185	3,090	1,490	534	304	732	960	732	192	336	102
18	115	171	7,170	2,460	478	671	604	1,020	552	186	448	98
19	107	164		1,510	430	522	725	977	564	172	810	97
20	105	156		1,120	397	494	1,160	1,040	604	177	528	94
21	109	358	2,700	925	375	571	1,460	875	666	199	397	90
22	119	343		794	361	1,240	1,410	770	637	183	448	89
23	109	a323		778	371	1,020	1,110	763	617	166	494	87
24	144	a304	1,360	2,660	355	2,200	1,090	695	504	189	386	87
25	376	284	1,060	2,600	339	2,160	858	652	434	157	333	84
26	612	267	1,680	1,310	355	1,380	740	604	408	222	304	80
27	476	297	5,440	1,040	336	1,010	702	577	378	239	277	79
28	368	674	a5,700	1,040	322	925	770	680	349	219	268	80
29	284	595	a7,000	1,040	.....	968	900	900	302	195	242	80
30	235	952	3,920	826	.....	1,210	942	1,060	367	174	224	83
31	205	.....	4,460	688	.....	1,120	.....	1,160	.....	157	214	.....

a Estimated.

NOTE.—Braced figure shows mean discharge for period indicated, based on flow of Middle and South forks.

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Monthly discharge of North Fork of Snoqualmie River near North Bend, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	612	98	195	1.91	2.20	12,000
November	1,110	156	393	3.85	4.30	23,400
December	7,170	476	2,670	26.2	30.21	164,000
January	3,500	688	1,600	15.7	18.10	98,400
February	2,540	322	861	8.44	8.79	47,800
March	2,200	234	662	6.49	7.37	40,100
April	1,460	443	825	8.09	9.03	49,100
May	1,510	577	871	8.54	9.85	53,600
June	1,410	302	755	7.40	8.26	44,900
July	307	157	208	2.04	2.35	12,800
August	1,510	153	389	3.81	4.39	23,900
September	199	79	115	1.13	1.26	6,840
The year	7,170	79	797	7.81	106.11	577,000

SOUTH FORK OF SNOQUALMIE RIVER AT NORTH BEND, WASH.

LOCATION.—In SE. ¼ sec. 9, T. 23 N., R. 8 E., at Cooper ranch, half a mile south of North Bend, King County, and 3½ miles above mouth.

DRAINAGE AREA.—84 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 21, 1907, to February 29, 1908, and June 26, 1908, to September 30, 1918. All records prior to October 1, 1915, published in Water-Supply Paper 412.

GAGE.—Friez water-stage recorder on left bank at Cooper ranch, installed October 2, 1916; inspected by E. H. Robinson. Previous gages as follows: July 6, 1907, to August 31, 1912, vertical staff at Northern Pacific Railway bridge 2½ miles above mouth; September 1, 1912, to October 1, 1916, Fuller and Friez water-stage recorders at same site and datum.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 145 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel; shifting at extremely high stages. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 10.76 feet at 9 a. m. December 18 (discharge, 5,400 second-feet); minimum stage 1.65 feet at 6 a. m. September 29 (discharge, 88 second-feet).

1907–1918: Maximum stage recorded, "Water over gage" November 3, 4, 19, 23, and 29, 1909 (gage height and discharge not determined); minimum stage recorded 0.70 foot October 10, 11, 1908 (discharge, 68 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 18. Rating curves well defined below 3,000 second-feet; extended above. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Partial clogging of intake pipe after December 18, caused lag of water stage in well behind that in river. This caused slight uncertainty in daily records for periods of rapidly changing stage, but had little or no effect on monthly records. Records good.

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COOPERATION.—Puget Sound Traction, Light & Power Co. furnished gage-height record and made some discharge measurements.

Discharge measurements of South Fork of Snoqualmie River at North Bend, Wash., during year ending Sept. 30, 1918.

Date.	Made by—	Gage height (river gage).	Discharge.	Date.	Made by—	Gage height (river gage).	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	E. H. Robinson	1.28	94	Apr. 1	E. H. Robinson	3.88	841
22	do	1.30	95	3	do	3.44	653
Jan. 2	Parker and Robinson	6.01	2,010	Sept. 14	Parker and Calkins	1.77	108
3	G. L. Parker	5.09	1,500	17	Calkins and Parker	1.73	103
19	E. H. Robinson	4.20	1,020				

Daily discharge, in second-feet, of South Fork of Snoqualmie River at North Bend, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	124	138	377	3,550	660	439	863	863	748	336	145	182
2	126	138	341	1,950	638	428	748	936	638	326	185	180
3	165	258	353	1,600	617	425	660	1,080	576	307	160	170
4	145	494	594	1,290	725	417	617	1,240	617	292	137	162
5	128	332	494	1,830	1,140	403	596	1,040	793	292	137	154
6	118	295	473	1,540	1,240	389	576	840	960	282	137	150
7	114	254	430	1,830	1,270	376	576	748	1,040	276	140	143
8	109	230	377	1,490	1,010	376	617	725	960	273	147	137
9	107	196	441	1,160	887	372	770	660	911	267	226	130
10	105	184	462	960	1,410	369	936	596	1,010	288	346	124
11	105	172	746	1,040	1,240	359	887	617	911	276	439	119
12	100	174	1,160	1,540	1,040	356	816	703	887	249	307	115
13	98	196	3,540	1,240	887	346	770	770	936	232	246	109
14	96	174	4,560	1,080	793	336	748	770	770	229	212	109
15	94	163	2,740	1,010	725	346	703	725	638	226	223	107
16	94	158	2,740	960	660	362	660	748	596	240	221	106
17	96	147	3,070	936	638	396	681	748	660	232	212	104
18	93	143	5,100	1,190	596	511	638	770	576	232	243	102
19	91	132	3,590	1,010	555	503	660	748	555	221	476	102
20	91	138	1,910	863	511	515	793	770	576	215	410	100
21	93	206	1,410	742	480	576	1,010	703	596	215	320	100
22	94	226	2,980	703	458	863	1,110	660	617	199	326	100
23	91	184	2,070	681	472	863	1,010	638	596	191	343	96
24	100	165	1,300	1,310	439	1,110	985	617	535	178	307	96
25	156	163	1,040	1,390	425	1,190	840	576	484	170	276	94
26	249	156	1,090	1,040	472	985	770	555	446	172	249	93
27	223	161	3,730	887	454	840	748	555	393	175	229	91
28	218	236	4,320	911	428	793	770	617	383	160	221	90
29	168	238	4,920	985	.....	793	840	793	349	154	210	90
30	141	452	3,760	816	.....	911	887	911	343	147	202	94
31	138	.....	3,280	703	.....	936	.....	936	.....	140	193	.....

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Monthly discharge of South Fork of Snoqualmie River at North Bend, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 84 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	249	91	125	1.49	1.72	7,690
November	494	138	210	2.50	2.79	12,500
December	5,100	341	2,050	24.4	28.13	126,000
January	3,550	681	1,250	14.9	17.18	76,900
February	1,410	425	745	8.87	9.24	41,400
March	1,190	336	577	6.87	7.92	35,500
April	1,110	576	776	9.24	10.31	46,200
May	1,240	555	762	9.08	10.47	46,900
June	1,040	343	670	7.98	8.90	39,900
July	336	140	232	2.76	3.18	14,200
August	476	137	246	2.93	3.38	15,100
September	128	90	118	1.40	1.56	7,020
The year	5,100	90	648	7.71	104.78	469,000

STILAGUAMISH RIVER BASIN.

DEER CREEK AT OSO, WASH.

LOCATION.—In sec. 5, T. 32 N., R. 7 W., 1¼ miles above junction with North Fork of Stilaguamish River and 1¼ miles from Oso, Snohomish County.

DRAINAGE AREA.—84 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 11, 1917, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank about 250 feet below mouth of 3-mile steep rock canyon; inspected successively by H. H. Tinker, H. E. Holmstad, C. L. Kamm, Z. Almy, and W. A. Palmer. Gage datum lowered 0.50 foot on August 13, 1918.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge at Oso, 1¼ miles downstream.

CHANNNEL AND CONTROL.—Bed composed of boulders and gravel overlying bedrock. Control practically permanent. Banks high. One channel at all stages. Stage of zero flow, -0.2 ± 0.1 foot, determined September 12, 1918.

EXTREMES OF DISCHARGE.—Maximum stage during period of records, 10.05 feet December 18, 1917, from high-water mark in well (discharge, 9,300 second-feet); minimum stage recorded, 0.59 foot at 6 p. m. September 29, 1918 (discharge, 30 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 3,000 second-feet; extended above. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage-height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent except for extreme high water and for periods when water-stage recorder was not operating.

COOPERATION.—Station maintained in cooperation with Western Power Co.

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Discharge measurements of Deer Creek at Oso, Wash., during the period Aug. 4, 1917, to Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Aug. 4	John McCombs	1.08	153	Apr. 27	J. E. Stewart	2.04	404
12	do	.77	106	28	do	2.21	463
Oct. 1	G. L. Parker	.89	168	May 15	Lasley Lee	2.13	468
Nov. 13	Lasley Lee	1.25	182	23	do	1.95	398
Dec. 22	T. R. Newell	4.47	1,990	June 6	J. E. Stewart	2.67	668
24	do	2.23	531	7	do	2.40	554
Jan. 4	do	4.13	1,590	Aug. 13	Lee and Calkins	1.57	142
5	do	4.09	1,610	14	Calkins and Lee	1.46	126
9	do	3.07	890	Sept. 12	T. G. Bedford	.76	41
29	do	2.29	544	12	do	.76	45
Mar. 7	do	.88	138	14	do	.74	42

NOTE.—Gage datum lowered 0.50 foot on Aug. 13, 1918.

Daily discharge, in second-feet, of Deer Creek at Oso, Wash., for the period Aug. 11, 1917, to Sept. 30, 1918.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1917.			1917.			1917.		
1		53	11	98	189	21	98	51
2		52	12	98	114	22	79	51
3		51	13	97	122	23	73	49
4		50	14	93	96	24	69	48
5		49	15	89	79	25	66	72
6		54	16	87	70	26	62	591
7		69	17	83	63	27	60	418
8		60	18	79	58	28	59	518
9		59	19	77	56	29	57	216
10		63	20	111	53	30	56	137
						31	54	

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917-18.												
1	118	176	434	2,440	373		529	606	599	117	65	73
2	605	344	356	1,170	345		399	752	634	108	75	67
3	372	2,540	418	2,450	580		334	948	447	97	55	63
4	227	1,360	677	1,910	2,200		281	840	471	89	41	60
5	161	732	344	1,530	1,850	155	279	656	532	88	37	56
6	128	628	338	2,410	2,050		272	510	639	83	37	54
7	111	396	266	1,710	1,510		331	529	623	81	41	51
8	98	293	349	1,040	726	111	538	490	554	77	67	50
9	89	230	1,160	859	1,020	106	1,100	434	589	78	108	49
10	83	200	568	612	1,900	104	829	422	827	130	874	48
11	77	180	1,300	670	817	106	611	473	551	123	549	46
12	74	200	703	1,770	612	138	554	499	514	82	230	44
13	69	182	5,150	892	462	117	511	497	495	70	159	43
14	66	153		837	359	112	438	450	422	70	125	42
15	64	137		749	309	140	403	466	315	64	162	41
16	67	123		622	275	189	419	535	302	63	155	40
17	66	116		1,830	253	381	411	530	305	61	131	39
18	61	108	3,550	1,940	237	1,250	327	831	240	59	304	38
19	58	104		882	222	508	449	991	237	58	290	37
20	57	192		589	205	648	861	873	245	220	173	37
21	64	386		474	186	1,250	925	589	250	168	133	36
22	61	198		480		2,510	802	450	250	89	491	37
23	59	159	824	661		930	696	408	230	74	380	37
24	178	145	533	1,960		3,040	656	331	195	65	217	37
25	439	232	422	852	180	1,930	499	312	163	66	159	36
26	359	155	923	546		870	442	302	163	398	131	35
27	1,030	514	3,440	452		634	450	338	153	172	112	34
28	312	1,020	3,850	722		702	494	476	133	111	99	33
29	198	438	4,620	546	.....	708	600	526	120	87	90	31
30	163	606		426	.....	850	623	783	120	75	84	34
31	159	.....	3,880	396	.....	726	.....	640	.....	68	78	.....

NOTE.—Braced figures show estimated mean discharge for periods indicated, based on flow of Sultan River.

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Monthly discharge of Deer Creek at Oso, Wash., for the period Aug. 11, 1917, to Sept. 30, 1918.

[Drainage area, 84 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1917.						
August 11-31	111	54	78.3	0.932	0.73	3,260
September	591	49	120	1.43	1.60	7,140
The period						10,400
1917-18.						
October	1,030	57	183	2.18	2.51	11,300
November	2,540	104	408	4.86	5.42	24,300
December		266	2,170	25.8	29.74	133,000
January	2,450	396	1,110	13.2	15.22	68,200
February	2,200		634	7.55	7.86	35,200
March	3,040	104	618	7.36	8.48	38,000
April	1,100	272	535	6.37	7.11	31,800
May	991	302	564	6.71	7.74	34,700
June	827	120	374	4.45	4.96	22,200
July	398	58	103	1.23	1.42	6,330
August	874	37	182	2.17	2.50	11,200
September	73	31	44.3	.527	.59	2,640
The year		31	579	6.89	93.55	419,000

SKAGIT RIVER BASIN.

SKAGIT RIVER AT REFLECTOR BAR, NEAR MARBLEMOUNT, WASH.

LOCATION.—In sec. 8, T. 37 N., R. 13 E (unsurveyed) at Reflector Bar ranger station, just below mouth of Canyon Diablo, three-quarters of a mile above Stetattle Creek, 1½ miles below Thunder Creek, and 23 miles (by trail) northeast of Marblemount, Whatcom County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 6, 1913, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank, 75 feet below mouth of Canyon Diablo, installed April 13, 1914; inspected by Thomas Thompson, F. E. Davis, Glee Davis, and Mrs. L. J. Davis. Prior to April 13, 1914, inclined staff at same site but at datum 2.00 feet higher.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Control 200 feet below gage composed of large boulders, gravel, and sand; may shift during floods. One channel at all stages. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 12.0 feet at 6.30 p. m. December 29 (discharge, 37,300 second-feet); minimum stage from recorder, 1.84 feet at 2 p. m. October 31 (discharge, 786 second-feet).

1913-1918: Maximum stage same as above; minimum stage recorded, 1.74 feet from 1 to 10 a. m. January 28, 1915 (discharge, 707 second-feet). Hydrographic comparison with flow of Sauk River at Darrington, Baker River near Concrete, and Skagit River near Sedro Woolley, and study of weather records indicate that discharge may have been 700 second-feet January 12, 13, and 31, 1916.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

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ACCURACY.—Stage-discharge relation changed during flood on December 29. Rating curves well defined. Operation of water-stage recorder not entirely satisfactory, but good during critical periods. Gage-height record somewhat uncertain owing to partial clogging of intake pipe. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records fair.

COOPERATION.—Station maintained in cooperation with United States Forest Service and Skagit Power Co. until about July 1, 1918, since which date the city engineer of Seattle has furnished gage-height record.

Discharge measurements of Skagit River at Reflector Bar, near Marblemount, Wash., during the year ending Sept. 30, 1918.

[Made by J. E. Stewart.]

Date.	Gage height.[a]	Discharge.
	Feet.	*Sec.-ft.*
May 1	5.81	9,430
2	6.00	10,000
June 13	8.92	22,300
14	8.71	21,000
14	8.09	18,200
15	7.07	14,100
15	6.84	13,000

[a] Outside gage.

Daily discharge, in second-feet, of Skagit River at Reflector Bar, near Marblemount, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,620	917	1,480	31,200	2,200	1,620		9,380	9,380	8,140	5,300	3,320
2	3,130	956	1,430	24,900	2,180	1,550	3,110	10,000	8,140	7,850	5,560	2,700
3	4,020	2,730	1,380	17,900	2,490	1,560		11,400	7,000	7,000	4,570	2,470
4	3,590	2,630	1,330	14,100	2,800	1,530		13,300	7,280	6,600	3,990	2,430
5	3,160	2,290	1,280	11,400	3,110	1,460	3,110	11,800	7,850	6,600	3,880	2,510
6	2,720	2,120	1,230	10,400	3,110	1,420	3,110	10,000	10,000	6,200	3,990	2,600
7	2,290	1,780	1,180	10,000	3,110	1,430	3,220	8,750	13,700	6,600	3,880	2,600
8	1,860	1,600	1,130	8,750	3,370	1,420	3,430	7,850	15,800	7,000	3,880	2,600
9	1,810	1,460	1,140	7,560	3,620	1,400	7,000	7,280	16,600	8,140	3,650	2,800
10	1,690	1,370	1,120	6,730	3,880	1,350	5,430	6,730	21,500	9,380	3,650	2,800
11	1,600	1,340	1,160	6,200	3,650	1,300	5,680	7,000	20,200	7,280	4,220	2,700
12	1,570	1,340	1,130	5,810	3,430	1,270	5,810	7,850	18,800	6,330	3,650	2,800
13	1,450	1,300	1,400	5,300	3,110	1,240	5,430	9,380	21,800	6,070	3,650	2,700
14	1,520	1,220	2,900	4,690	2,900	1,200	5,060	10,400	20,100	6,600	3,760	2,600
15	1,390	1,140	3,180	4,570	2,700	1,160	4,570	11,800	14,500	8,440	4,100	2,600
16	1,210	1,100	5,540	4,220	2,510	1,150	4,340	11,100	11,800	8,750	3,760	2,510
17	1,080	1,040	4,970	4,100	2,430	1,220	3,990	10,000	12,600	8,750	3,430	2,700
18	1,030	1,030	9,650	4,690	2,180	1,560	3,760	9,060	12,200	8,750	3,650	2,700
19	987	1,020	8,630	4,340	2,000	1,560	3,650	8,140	11,400	8,140	3,430	2,900
20	946	2,260	5,500	4,100	1,920	1,630	5,060	7,280	11,400	6,860	3,000	2,800
21	1,180	4,970	4,140	3,760	1,910	1,780	7,000	6,460	13,300	5,940	3,220	2,450
22	1,040	3,800	3,480		1,870	2,600	7,560	6,070	14,900	5,300	3,430	2,210
23	1,020	2,900	2,900		1,910	2,700	7,560	5,680	14,100	5,300	3,650	1,870
24	997	2,290	2,460		1,800	3,110	7,850	5,300	12,200	5,180	3,650	1,720
25	926	2,040	2,290		1,750	3,760	7,280	4,930	10,400	4,930	3,430	1,680
26	907	1,780	2,210	3,000	1,720	3,540	6,600	4,810	10,000	4,570	3,430	1,640
27	898	1,740	2,720		1,630	3,320	6,460	4,810	9,710	4,570	3,000	1,600
28	840	1,840	5,780		1,620	3,110	6,600	5,430	8,440	4,690	2,600	1,560
29	840	1,660	27,200		.....		7,560	7,280	7,560	5,060	2,800	1,520
30	813	1,620	24,400		.....	3,110	8,440	9,710	7,850	5,060	3,000	2,460
31	822	.....	23,500	2,230	.....		.....	10,700	.....	5,180	3,430	.....

NOTE.—Gage-height record incorrect for following periods for which discharge was interpolated or estimated from partial gage-height record and weather records, Oct. 4–7, Dec. 2–7, Jan. 22 to Feb. 10, Mar. 29 to Apr. 4, and Sept. 25–30.

Braced figures show mean discharge for periods indicated.

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Monthly discharge of Skagit River at Reflector Bar, near Marblemount, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4,020	813	1,580	97,200
November	4,970	917	1,840	109,000
December	27,200	1,120	5,090	313,000
January	31,200	2,230	7,220	444,000
February	3,880	1,620	2,530	141,000
March	3,760	1,150	1,980	122,000
April	8,440	3,110	5,270	314,000
May	13,300	4,810	8,380	515,000
June	21,800	7,000	12,700	756,000
July	9,380	4,570	6,620	407,000
August	5,560	2,600	3,700	228,000
September	3,320	1,520	2,420	144,000
The year	31,200	813	4,960	3,590,000

SKAGIT RIVER NEAR SEDRO WOOLLEY, WASH.

LOCATION.—In NW. ¼ sec. 36, T. 35 N., R. 4 E., at Northern Pacific Railway bridge, three-fourths mile below intake of Beatty's Slough, 1½ miles south of Sedro Woolley Skagit County, 21 miles above mouth and 32 miles below Baker River.

DRAINAGE AREA.—2,930 square miles (measured on General Land Office and British Columbia maps).

RECORDS AVAILABLE.—May 1, 1908, to September 30, 1918.

GAGE.—Chain gage on railway bridge, installed September 27, 1916; read by E. J. Woods. Prior to September 27, 1916, vertical staff on upstream draw guard of railway bridge and temporary vertical staff, installed September 25, 1915, used when stage was below 37 feet, on downstream side of group of piles, 50 feet above third concrete pier of railway bridge from left bank; at same datum. Zero of gage set at elevation of extreme low water in Puget Sound.

DISCHARGE MEASUREMENTS.—Made from highway bridge one-third mile above gage. Beatty's Slough measured from highway bridge.

CHANNEL AND CONTROL.—Gravel; shifts at high stages. Banks not subject to overflow except during floods.

EXTREMES OF DISCHARGE.—Maximum stage during year determined from high-water marks 54.9 feet at 4.30 a. m. December 30 (discharge, 151,000 second-feet); minimum stage recorded, 32.70 feet October 21 (discharge, 4,230 second-feet).

1908–1918: Maximum stage recorded same as above; discharge probably greater November 30, 1909, rating curve not well defined; minimum stage recorded, 32.3 feet September 29–30 and October 10–11, 1915 (discharge, 2,740 second-feet).

ICE.—Stage-discharge relation seldom affected by ice.

DIVERSION.—Beatty's Slough carries from 1.5 per cent of total flow at low stages to 8 per cent at high stages. Amount determined at each visit and added to flow measured in main channel.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 19, January 3 to February 7, June 8, and July 19 to August 8. Rating curves fairly well defined. Gage read once daily to hundredths. Practically no diurnal fluctuation. Daily discharge ascertained by applying daily gage height to rating table; shifting-control method used, January 3 to February 7 and July 19 to August 8. Records good.

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Discharge measurements of Skagit River near Sedro Woolley, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 23	T. R. Newell	39.20	27,500	Jan. 11	T. R. Newell	39.22	24,600
26	do	37.02	17,000	Mar. 9	do	34.04	6,460
Jan. 2	do	48.24	88,800	Apr. 30	J. E. Stewart	38.64	23,400
3	do	45.25	64,100	June 18	do	40.20	33,700

Daily discharge, in second-feet, of Skagit River near Sedro Woolley, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7,680	5,200	10,100	112,000	11,800	7,680	17,300	23,100	26,500	28,500	16,100	11,400
2	7,680	6,270	9,180	91,900	11,100	7,680	14,900	25,000	22,200	29,000	17,300	11,100
3	19,500	12,400	8,570	64,600	11,100	7,390	13,500	29,000	18,600	26,500	16,500	9,810
4	17,300	29,500	9,180	58,900	13,800	7,390	12,400	37,100	17,300	23,600	13,800	9,180
5	13,500	17,300	9,180	49,800	24,000	7,100	11,800	35,400	19,000	23,600	12,800	8,570
6	11,100	16,900	8,570	41,900	21,800	6,820	11,400	29,000	23,600	23,100	12,800	8,870
7	9,810	12,800	7,970	50,500	25,500	6,540	11,400	25,000	33,200	23,600	12,400	8,870
8	8,570	10,800	7,680	39,500	20,000	6,540	11,400	22,600	41,300	24,500	12,100	8,570
9	7,680	8,870	8,570	33,200	17,300	6,540	14,900	20,400	41,300	27,500	12,800	9,180
10	7,680	8,270	9,490	27,500	22,200	6,270	20,000	18,600	48,500	32,700	12,400	9,490
11	7,390	7,100	9,490	24,000	23,600	6,000	19,500	19,000	61,000	29,000	18,200	9,490
12	7,100	7,100	9,810	25,500	20,000	6,270	18,200	20,000	52,600	23,100	15,700	9,180
13	6,540	7,680	12,400	24,000	17,300	6,000	17,700	22,200	54,700	20,800	13,100	9,490
14	6,270	6,820	52,600	21,800	14,900	6,000	16,100	24,500	57,500	20,800	12,400	8,870
15	6,540	6,820	43,100	21,800	13,500	5,730	14,600	26,000	45,500	24,500	12,400	9,180
16	6,000	5,730	66,200	19,000	12,400	5,730	13,500	28,000	35,400	30,000	13,800	8,870
17	5,460	5,460	61,700	17,700	11,800	6,540	12,800	25,500	36,600	30,000	11,800	8,570
18	4,950	4,950	50,500	32,700	11,100	10,400	11,800	24,000	34,400	30,000	11,400	8,570
19	4,700	5,200	102,000	26,000	10,100	10,400	11,400	22,200	33,200	28,500	16,100	8,270
20	4,460	4,950	56,100	21,300	9,490	10,400	13,500	21,300	33,800	24,000	12,800	9,180
21	4,230	26,500	32,700	18,600	9,180	11,400	20,000	19,000	38,900	23,600	11,400	8,570
22	5,200	19,500	29,500	16,900	8,870	19,000	23,600	16,900	46,700	18,600	11,400	7,680
23	4,460	14,200	27,500	16,500	8,870	20,000	23,100	15,700	45,500	17,700	13,800	7,390
24	4,460	10,800	22,200	17,700	8,870	20,400	22,600	14,900	40,700	17,700	13,800	6,540
25	4,950	9,810	18,600	20,400	8,270	30,500	22,200	13,800	35,400	16,900	12,800	6,270
26	5,730	8,570	17,300	17,300	8,570	23,600	19,500	13,500	32,700	17,700	12,400	6,000
27	6,540	7,680	27,500	15,300	8,270	18,200	18,200	13,100	32,700	17,300	11,400	6,540
28	6,000	11,800	58,900	14,960	7,680	16,100	17,700	13,800	30,000	16,100	10,400	7,100
29	4,460	10,800	85,400	15,700	.....	15,300	19,000	17,700	26,500	16,100	9,810	7,680
30	4,700	10,400	140,000	13,500	.....	15,700	22,600	20,800	26,500	16,500	10,100	7,680
31	4,460	.....	84,600	12,400	.....	18,200	.....	31,000	.....	16,100	10,800	.....

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Monthly discharge of Skagit River near Sedro Woolley, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 2,980 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	19,500	4,230	7,260	2.48	2.86	446,000
November	29,500	4,950	10,700	3.65	4.07	637,000
December	140,000	7,680	35,400	12.1	13.95	2,180,000
January	112,000	12,400	31,700	10.8	12.45	1,950,000
February	25,500	7,680	14,000	4.78	4.98	778,000
March	30,500	5,730	11,300	3.86	4.45	695,000
April	23,000	11,400	16,800	5.67	6.33	988,000
May	37,100	13,100	22,200	7.58	8.74	1,360,000
June	61,000	17,300	36,400	12.4	13.83	2,170,000
July	32,700	16,100	23,100	7.88	9.08	1,420,000
August	17,300	9,810	13,100	4.47	5.15	806,000
September	11,400	6,000	8,540	2.91	3.25	508,000
The year	140,000	4,230	19,200	6.55	89.14	13,900,000

NORTH FORK OF SAUK RIVER NEAR BARLOW PASS, WASH.

LOCATION.—In sec. 14, T. 30 N., R. 11 E., 500 feet below dam site, 2¼ miles above confluence with South Fork, and 7 miles northeast of Barlow Pass, Snohomish County.

DRAINAGE AREA.—76 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Vertical staff on right bank, October 1 to 8, and January 22 to September 1; on left bank, opposite, September 2 to 30. Stevens continuous water-stage recorder on right bank at same site as staff gage, October 9 to December 29, destroyed by floods and record after December 22 lost. All gages referred to same datum; staff gage read by H. W. Twa; recorder inspected by Nicolai Aall.

DISCHARGE MEASUREMENTS.—Made by wading near cable or from cable one-third mile above gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; banks high; one channel at all stages. Principal control composed of boulders about 50 feet below gage; shifting.

EXTREMES OF DISCHARGE.—Maximum stage during the year, as determined by leveling to high-water mark, 14.0 feet on December 29 (discharge, 11,000 second-feet); minimum stage recorded, 1.00 foot, probably on October 20 (discharge, 75 second-feet).

ICE.—None.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed often during the fall of year and during flood of June 13, permanent for remainder of year. Rating curves well defined between 100 and 2,500 second-feet; extended to 11,000 second-feet by study of flood-peak discharge at all stations on Sauk and Skagit rivers. October 1 to 8, staff gage read twice daily to hundredths. Water-stage recorder in operation October 9 to December 22. Staff gage read three times daily to hundredths January 22 to September 30. Daily discharge ascertained by applying mean daily gage height to rating table. Records good, January 22 to September 30; fair for remainder of year.

COOPERATION.—Station maintained in cooperation with American Nitrogen Products Co.

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Discharge measurements of North Fork of Sauk River near Barlow Pass, Wash., during the period Sept. 30, 1917, to Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Sept. 30	Parker and Lee	1.70	150	Apr. 3	Nicolai Aall	2.93	344
Nov. 8	Lee and Aall	2.30	212	22	do	5.25	867
8	Aall and Lee	2.29	211	30	do	5.43	888
Dec. 8	Nicolai Aall	1.47	179	May 9	do	4.70	706
14	do	6.10	1,190	20	Lee and Aall	4.45	643
Jan. 17	do	.....	598	20	Aall and Lee	4.45	644
29	do	2.78	342	June 2	Nicolai Aall	4.65	694
Feb. 19	do	2.07	214	6	Aall and Twa	6.97	1,[illegible]
Mar. 2	do	1.60	144	9	Nicolai Aall	8.20	2,180
14	do	1.27	111	29	do	5.47	[illegible]
29	do	3.08	375	July 13	do	4.25	574

NOTE.—Gage heights corrected to datum established Oct. 9, 1918.

Daily discharge, in second-feet, of North Fork of Sauk River near Barlow Pass., Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	165	140	260		292	155	422	952	839	1,040	399	240
2	292		229		284	148	386	1,070	706	945	456	210
3	284		222	1,600	292	147	350	1,270	634	827	354	203
4	244		236		395	141	334	1,580	758	800	311	196
5	207	350	207		450	134	316	1,270	952	800	302	196
6	168		200		498	125	316	1,010	1,350	773	320	196
7	161		186		431	126	325	923	1,860	800	302	196
8	154		180	1,000	377	127	377	785	1,800	855	311	182
9	144	186			359	123	590	706	2,050	975	328	203
10	138	180			395	121	612	681	2,580	1,040	390	189
11	129	180	510		377	117	612	839	2,120	648	428	196
12	125	193			342	114	612	839	2,050	602	328	196
13	122	173		600	316	110	508	895	2,500	558	302	189
14	121	154			292	110	488	1,040	1,980	696	302	189
15	105	138	975		276	112	450	981	1,380	885	336	189
16	108	125	1,700		260	116	413	895	1,300	855	286	189
17	101	117	1,300		244	129	377	839	1,480	885	270	189
18	94	110	3,220		229	200	368	785	1,260	800	381	176
19		103	2,250	600	214	168	386	706	1,260	648	336	182
20		268	1,210		193	186	590	634	1,380	526	286	176
21	80	525	868		186	222	785	569	1,740	456	286	157
22		377	1,200	440	186	395	867	548	1,860	428	345	140
23		316		413	193	334	895	528	1,630	428	294	125
24		284		508	173	342	923	488	1,430	428	262	115
25		284	690	431	172	548	785	460	1,260	418	262	112
26	110	236		395	169	634	706	460	1,260	456	262	114
27		252		377	161	488	681	498	1,140	399	232	127
28		300		368	156	413	706	590	975	399	210	143
29	95	260	3,950	334	.....	377	839	812	885	399	210	151
30	88	276		316	.....	450	923	1,070	945	399	232	176
31	102	.....		292	.....	478	.....	1,040	.....	390	240	.....

NOTE.—Braced figures show mean discharge for periods indicated; for October and November based on range of stage, and for remaining periods based on comparison with flow of Sauk River.

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Monthly discharge of North Fork of Sauk River near Barlow Pass, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 76 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	292	.....	132	1.74	2.01	8,120
November	525	103	254	3.34	3.73	15,100
December	.....	180	1,290	17.0	19.60	79,300
January	.....	292	757	9.96	11.48	46,500
February	498	156	283	3.72	3.87	15,700
March	634	110	238	3.13	3.61	14,600
April	923	316	565	7.43	8.29	33,600
May	1,580	460	831	10.9	12.57	51,100
June	2,580	634	1,450	19.1	21.31	86,300
July	1,040	390	663	8.72	10.05	40,800
August	456	210	308	4.05	4.67	18,900
September	240	112	175	2.30	2.57	10,400
The year	.....	.....	581	7.64	103.76	420,000

SAUK RIVER ABOVE WHITECHUCK RIVER, NEAR DARRINGTON, WASH.

LOCATION.—In NW. ¼ sec. 24, T. 31 N., R. 10 E., half a mile above Whitechuck River and 9½ miles southeast of Darrington, Snohomish County.

DRAINAGE AREA.—152 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 29 to November 17, 1910 (fragmentary). October 1, 1917, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by Nicolai Aall. Gage used in 1910 was inclined staff on left bank one-eighth mile above Whitechuck River.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 75 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; shifting. Principal control about 150 feet below gage; shifted during high water. Banks high; not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 13.3 feet at 8 a. m. December 29 (discharge, 21,000 second-feet); minimum discharge estimated as 220 second-feet on September 25, when recorder was not in operation.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed February 5 to 20. Rating curve used October 1 to February 4 well defined below 2,500 second-feet; extended to 21,000 second-feet by form of later curve and by study of flood-peak discharge at all stations on Sauk and Skagit rivers. Rating curve used February 21 to September 30, well defined below 4,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. From March 25 to June 14 intake partly clogged. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals; shifting-control method used February 5 to 20. Records good except for periods estimated and days of extreme high water, for which they are fair.

COOPERATION.—Station maintained in cooperation with American Nitrogen Products Co.

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Discharge measurements of Sauk River above Whitechuck River, near Darrington, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	Lesley Lee	2.10	268	May 16	Nicolai Aall	4.07	1,610
Nov. 7	Lee and Aall	2.83	637	17	Lesley Lee	4.01	1,500
Jan. 11	Nicolai Aall	4.01	1,670	27	Nicolai Aall	3.44	919
Feb. 24	do	2.82	466	June 8	do	5.12	3,070
Mar. 11	do	2.57	307	28	do	4.09	1,620
27	do	3.66	1,120	July 5	do	3.88	1,390
Apr. 8	do	3.36	870	Aug. 10	do	3.55	987
27	do	3.84	1,390				

Daily discharge, in second-feet, of Sauk River above Whitechuck River, near Darrington, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		388	500	7,380	848	408	1,120		1,860	1,790	784	496
2		392	447	4,420	825	414	970		1,520	1,720	1,010	451
3		1,300	458	3,770	848	408	856		1,220	1,500	706	396
4		1,330	600	4,110	1,410	378	816		1,210	1,390	611	373
5	670	825	484	3,770	2,000	373	776	2,100	1,520	1,430	569	
6		871	463	3,520	1,930	356	760		2,140	1,400	576	
7		650	407	3,280	1,860	338	768		3,130	1,440	569	340
8		546	383	2,720	1,360	333	824		3,130	1,560	569	
9		479	484	2,200	1,190	327	1,320	1,330	3,050	1,790	625	
10		432	479	1,790	2,000	322	3,130	1,270	3,790	2,000	952	
11	390	417	678	1,720	1,580	317	1,570	1,300	3,450	1,300	1,010	
12		432	638	1,920	1,280	322	1,460	1,460	3,050	1,140	720	
13		417	2,580	1,660	1,040	317	1,320	1,720	3,450	1,080	618	
14		374	5,020	1,540	899	311	1,160	1,860	3,130	1,260	590	330
15		351	3,320	1,430	800	322	1,050	1,790	2,360	1,530	625	
16		321	5,620	1,290	736	361	961	1,650	2,210	1,580	604	
17		304	4,110	1,660	668	414	925	1,540	2,580	1,630	563	
18	330	284	11,600	2,580	632	683	848	1,460	2,070	1,530	752	
19		272	6,050	1,860	576	590	824	1,360	2,070	1,300	872	
20		550	8,280	1,480	536	668	1,060	1,290	2,360	1,040	661	300
21		958	2,350	1,280	503	800	1,720	1,190	2,890	934	604	
22	249	638	3,910	1,290	483	1,480	1,930	1,080	2,970	824	690	
23	230	511	2,650	1,150	490	1,170	1,860	1,040	2,810	800	713	
24	272	442	1,920	1,540	464	2,000	1,860	1,000	2,510	784	653	
25	347	432	1,540	1,380	451	2,210	1,660	952	2,210	776	590	
26	484	379	1,710	1,200	464	1,560	1,450	925	2,070	816	563	250
27	447	432	6,020	1,080	433	1,160	1,330	916	2,000	792	509	
28	369	594	8,000	1,100	421	1,010	1,340	1,000	1,720	744	458	
29	317	484	17,400	1,060	.....	970	1,550	1,500	1,560	760	439	306
30	300	540	7,810	966	.....	1,110		1,930	1,660	784	451	338
31	292	.....	7,950	871	.....	1,250	.....	2,280	.....	720	483	.....

NOTE.—Braced figures show mean discharge for periods indicated, based on flow at near-by stations.

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Monthly discharge of Sauk River above Whitechuck River, near Darrington, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 152 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	.....	.....	421	2.77	3.19	25,900
November	1,330	272	545	3.59	4.00	32,400
December	17,400	383	3,510	23.1	26.63	216,000
January	7,380	871	2,160	14.2	16.37	133,000
February	2,000	421	954	6.28	6.54	53,000
March	2,210	311	732	4.82	5.56	45,000
April	3,130	760	1,290	8.49	9.47	76,800
May	.....	916	1,570	10.3	11.87	96,500
June	3,790	1,210	2,390	15.7	17.52	142,000
July	2,000	720	1,230	8.09	9.33	75,600
August	1,010	439	650	4.28	4.93	40,000
September	496	.....	323	2.12	2.36	19,200
The year	17,400	.....	1,320	8.68	117.77	955,000

SAUK RIVER AT DARRINGTON, WASH.

LOCATION.—In SE. ¼ sec. 24, T. 32 N., R. 9 E., half a mile southeast of Darrington, Snohomish County, 2½ miles below Clear Creek, and 23 miles above mouth of river.

DRAINAGE AREA.—293 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 15, 1914, to September 30, 1918.

GAGE.—Vertical and inclined staff on left bank; installed January 7, 1918; read by Paul Schmidt. Previous gage, vertical staff at same site and datum; washed out December 17, 1917.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension bridge 700 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel and large boulders; shifting during high water. No well-defined control. Left bank at gage high and not subject to overflow; right bank flat and subject to overflow at extremely high stages. Stage of zero flow, estimated September 13, 1918, as −1.2 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year, determined by levels to high-water mark 15.0 feet at 9 a. m. December 29 (discharge, 36,000 second-feet); minimum stage recorded, 1.02 feet October 23 (discharge, 400 second-feet).

1914–1918: Maximum stage same as above; minimum stage recorded, 0.78 foot September 28–29, 1915 (discharge, 340 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during December floods. Rating curve used October 1 to December 17 well defined below 9,000 second-feet; curve used December 29 to September 30 well defined below 10,000 second-feet and extended to 50,000 second-feet by study of all known floods in the Skagit River basin. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent, except for periods estimated, for which they are fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

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Discharge measurements of Sauk River at Darrington, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 11	Lasley Lee	1.76	709	May 22	Lasley Lee	3.40	1,790
12	do	1.78	718	23	do	3.49	1,910
Jan. 8	T. R. Newell	5.17	4,570	June 7	J. E. Stewart	5.67	5,320
28	do	3.63	2,010	8	do	5.44	4,960
Mar. 6	do	1.96	648	9	do	5.54	5,120
Apr. 27	J. E. Stewart	3.79	2,200	10	do	6.41	6,990
29	do	4.06	2,610	Aug. 12	Lee and Calkins	2.78	1,220
May 16	Lasley Lee	4.05	2,590	Sept. 13	T. G. Bedford	2.00	696

Daily discharge, in second-feet, of Sauk River at Darrington, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	690	595	1,180		1,000	740	1,920	3,080	2,510	3,240	1,710	795
2	1,110	1,040	850		1,610	725	1,710	3,570	2,260	2,780	1,610	828
3	1,500	4,280	850		2,640	710	1,510	4,280	1,920	2,260	1,240	828
4	1,110	2,250	850	11,500	5,260	695	1,420	4,470	2,380	2,510	1,160	795
5	850	2,120	910		5,060	680	1,330	3,570	3,080	2,260	1,160	765
6	740	1,500	850		4,660	655	1,240	2,930	5,060	2,380	1,160	735
7	690	1,180	790	5,060	3,400	655	1,510	2,510	5,260	2,510	1,160	735
8	640	1,340	740	4,280	2,780	630	1,420	2,260	4,860	2,640	1,080	735
9	595	1,420	850	3,570	3,240	630	1,510	2,140	5,680	2,780	1,160	708
10	572	1,080	975	2,930	3,740	655	1,710	2,140	6,980	2,930	1,330	680
11	572	740	1,780	2,930	2,510	630	2,380	2,260	5,260	2,140	1,610	680
12	550	740	3,830	3,240	2,260	630	2,260	2,510	5,890	1,920	1,240	680
13	550	740	8,560	2,930	1,810	605	2,030	2,780	6,100	2,030	1,240	680
14	550	640	10,400	2,640	1,610	580	2,030	2,780	4,860	3,240	1,240	828
15	530	595	5,750	2,510	1,420	605	2,260	2,780	3,740	3,240	1,330	735
16	510	550	12,600	2,780	1,240	630	2,140	2,510	3,920	2,930	1,510	708
17	510	510	7,680	3,240	1,240	860	1,810	2,510	3,740	3,400	1,810	655
18	490	550		4,100	1,160	1,080	1,810	2,510	3,240	2,780	2,140	605
19	470	470		3,240	1,080	1,610	1,810	2,260	3,740	2,030	1,610	580
20	418	1,110		2,510	930	2,140	1,810	2,260	4,660	1,510	1,160	580
21	418	1,590	9,400	2,380	860	2,640	3,080	2,140	4,100	1,610	1,330	556
22	418	1,110		2,260	845	3,400	3,080	1,810	4,860	1,420	1,510	533
23	400	850		2,140	830	3,740	3,080	1,710	4,280	1,510	1,420	533
24	435	790		2,510	815	4,280	2,780	1,610	3,920	1,510	1,240	511
25	690	740		2,380	800	4,660	2,510	1,510	3,740	1,610	1,080	489
26	740	850		1,920	785	3,240	2,260	1,610	3,570	1,610	1,000	489
27	740	975		1,710	770	2,260	2,260	1,810	3,080	1,510	930	533
28	572	1,340	15,000	2,030	755	1,810	2,260	2,140	2,640	1,610	860	680
29	530	975		1,920	.....	2,140	2,510	2,510	2,930	1,610	828	680
30	490	1,260		1,710	.....	2,030	2,780	3,740	3,240	1,420	828	605
31	510	.....		1,420	.....	2,030	.....	3,080	.....	1,510	795	.....

NOTE.—Braced figures show mean discharge for periods indicated; based on comparison of flow at other stations in basin. Daily discharge estimated Feb. 22 to Mar. 4.

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Monthly discharge of Sauk River at Darrington, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 293 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	1,500	400	682	2.16	2.49	38,900
November	4,280	470	1,130	3.86	4.31	67,200
December	.....	740	7,430	25.4	29.28	457,000
January	.....	1,420	4,430	15.1	17.41	272,000
February	5,280	755	1,970	6.72	7.00	109,000
March	4,660	580	1,560	5.32	6.13	95,900
April	3,080	1,240	2,070	7.06	7.88	123,000
May	4,470	1,510	2,570	8.77	10.11	158,000
June	6,980	1,920	4,050	13.8	15.40	241,000
July	3,400	1,420	2,210	7.54	8.69	136,000
August	2,140	795	1,270	4.33	4.99	78,100
September	828	489	665	2.27	2.53	39,600
The year	.....	400	2,510	8.57	116.22	1,820,000

SOUTH FORK OF SAUK RIVER NEAR BARLOW PASS, WASH.

LOCATION.—In NE. ¼ sec. 27, T. 30 N., R. 11 E., 2¾ miles above confluence with North Fork and 5 miles northeast of Barlow Pass, Snohomish County.

DRAINAGE AREA.—32.7 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder, on right bank; inspected by Nicolai Aall.

DISCHARGE MEASUREMENTS.—Made by wading near cable or from cable 75 feet below gage.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel. Principal control 100 feet below gage; shifting during high water. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year 9.1 feet at 1.30 a. m. December 29 (discharge, 5,800 second-feet); minimum discharge estimated 40 second-feet on September 25 when recorder was out of order.

ICE.—Stage discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 29. Rating curve used October 1 to December 28, well defined below 200 second-feet, and fairly well defined to 2,000 second-feet; curve used December 29 to September 30 well defined below 1,500 second-feet; both curves extended to 5,800 second-feet by study of flood-peak discharge at all stations on Sauk and Skagit rivers. Operation of water-stage recorder satisfactory except for four short periods indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records good October to December, excellent January to September.

COOPERATION.—Station maintained in cooperation with American Nitrogen Products Co.

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Discharge measurements of South Fork of Sauk River near Barlow Pass, Wash., during the period Sept. 25, 1917, to Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Sept. 25	Lasley Lee	1.36	89	May 3	Nicolai Aall	3.64	66[illegible]
Nov. 9	Aall and Lee	1.76	160	18	Lee and Aall	3.02	311
9	Lee and Aall	1.75	154	18	Aall and Lee	3.01	31[illegible]
Jan. 5	Nicolai Aall	3.97	856	25	Nicolai Aall	2.67	20[illegible]
10	do	3.13	398	June 1	do	3.20	38[illegible]
23	do	2.74	209	5	do	3.28	42[illegible]
Feb. 22	do	2.15	96	7	do	3.84	7[illegible]
Mar. 5	do	1.94	58	10	do	4.14	8[illegible]
23	do	2.88	275	26	do	3.31	447
Apr. 5	do	2.55	177	July 18	do	3.27	449
19	do	2.68	221				

Daily discharge, in second-feet, of South Fork of Sauk River near Barlow Pass, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	121	132	160	1,890	148	75	287	450	425	415	252	154
2	315	140	134	990	140	72	228	498	336	406	331	140
3	360	613	140	862	152	68	201	637	291	344	217	126
4	243	540	175	1,050	382	66	187	780	323	323	183	114
5	182	494	136	934	503	60	178	600	461	349	163	109
6	149	352	123	908	471	57	176	466	643	340	161	107
7	124	250	104	794	425	55	180	381	801	358	163	105
8	109	194	98	612	295	54	236	340	752	386	163	103
9		156	136	471	277	52	462	306	787	455	187	103
10		136	123	381	509	52	471	291	1,020	461	392	107
11	100	130	163	353	372	52	410	306	851	336	372	109
12		132	163		283	51	367	353	794	272	239	109
13		126	1,050		233	48	310	420	875	259	197	107
14		112	1,410		194	48	269	410	719	319	189	105
15		100	948	350	174	52	233	381	531	420	192	105
16		90	1,500		159	62	228	353	487	461	194	103
17	70	85	1,160	412	146	98	225	332	577	487	176	105
18		79	3,300	658	132	154	199	319	466	461	258	103
19		77	1,300	440	120	150	211	302	482	381	299	101
20		247	684	332	115	172	332	306	553	295	219	99
21	65	422	502	269	109	210	509	272	686	262	189	58
22	66	252	1,160	239	103	381	520	246	706	228	222	52
23	62	178	648	233	97	283	487	242	655	217	228	
24	70	145	444	356	88	595	482	228	548	206	209	
25	116	137	358		88	599	410	206	487	206	185	
26	159	116	518		86	386	349	204	471	242	176	60
27	134	134	2,000	220	79	295	332	219	466	219	159	
28	103	204	2,490		75	265	340	281	372	211	138	
29	88	160	4,420		.....	262	395	420	327	225	132	
30	81	189	1,870		.....	332	445	542	367	225	136	
31	87	.....	2,430	152	.....	344	.....	565	.....	217	146	.....

NOTE.—Braced figures show mean discharge for periods indicated, based on flow at other stations in basin.

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Monthly discharge of South Fork of Sauk River near Barlow Pass, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 32.7 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	360	.....	118	3.61	4.16	7,260
November	613	77	202	6.18	6.90	12,000
December	4,420	98	963	29.4	33.89	59,200
January	1,890	152	498	15.2	17.52	30,600
February	509	75	213	6.51	6.78	11,800
March	599	48	176	5.38	6.20	10,800
April	520	176	322	9.85	10.99	19,200
May	780	204	376	11.5	13.26	23,100
June	1,020	291	575	17.6	19.64	34,200
July	487	206	322	9.85	11.36	19,800
August	392	132	209	6.39	7.37	12,900
September	154	.....	93.5	2.86	3.19	5,560
The year	4,420	.....	340	10.4	141.26	246,000

BAKER RIVER BELOW ANDERSON CREEK, NEAR CONCRETE, WASH.

LOCATION.—In SE. ¼ sec. 30, T. 37 N., R. 9 E., 350 feet below Anderson Creek, a quarter of a mile above Baker River ranger station, and 11 miles above Concrete, Whatcom County.

DRAINAGE AREA.—184 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 10, 1910, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder, on left bank, installed September 24, 1915; inspected by G. C. Burch and W. L. Stilwell. Previous gages as follows: September 10 to November 19, 1910, vertical staff at trail bridge one-eighth mile above Anderson Creek; readings reduced to datum of gage installed October 22, 1910, by means of relation curve; October 22, 1910, to September 4, 1913, vertical and inclined staff gage on left bank, 30 feet above present gage; September 30, 1913, to September 23, 1915, one inclined and two vertical sections at practically the same site as the gages previously used but at different datum. Water-stage recorder referred to datum of staff gage last used, but slight change in location changed the rating.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet above gage.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel over bedrock; not likely to shift except during extremely high water. No well-defined control. Right bank high and rocky; left bank fairly high, wooded, subject to overflow at about 11-foot stage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.7 feet at 12.30 p. m. December 29 (discharge, 36,800 second-feet); minimum stage recorded 2.43 feet at 4 p. m. March 13 (discharge, 502 second-feet).

1910-1918: Maximum stage same as above; minimum stage recorded, 2.6 feet February 27 and March 1, 1911 (discharge, 410 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

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ACCURACY.—Stage-discharge relation changed December 29. Rating curves well defined below 10,000 second-feet; extended above. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph, and for a few days during the year when there was considerable variation in stage by averaging results obtained by applying mean gage heights for shorter intervals. Records good except for September, for which they are poor.

COOPERATION.—Station maintained in cooperation with United States Forest Service.

Discharge measurements of Baker River below Anderson Creek, near Concrete, Wash., during the year ending Sept. 30, 1918.

[Made by J. E. Stewart.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 4	6.09	4,710	June 10	7.14	8,060
5	5.47	3,390	11	6.40	5,850
6	5.08	2,850	11	6.39	5,720

Daily discharge, in second-feet, of Baker River below Anderson Creek, near Concrete, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		975	1,370	20,200	1,560	620		2,780	2,780	3,510	2,580	
2		1,720	1,220	15,200	1,560	605		3,000	2,220	3,330	2,330	
3		9,110	1,140	12,200	1,560	586		4,040	1,900	2,850	2,000	
4	3,000	5,410	1,220	13,100	2,060	577	1,200	4,900	2,000	2,780	1,850	
5		3,470	1,110	13,500	2,110	555		3,710	2,640	2,850	1,900	1,500
6		2,640	1,040	9,050	2,110	538		2,780	3,710	2,850	1,850	
7		1,840	975	9,240	2,110	522		2,330	5,160	3,080	1,800	
8		1,460	911	7,260	1,700	522	1,520	2,110	5,160	3,420	1,900	
9		1,180	1,040	4,160	1,800	519		2,000	5,710	4,160		
10	1,300	1,140	1,010	2,850	2,160	516	2,280	2,000	7,780	4,400		
11		1,110	1,040	2,390	1,750	512		2,220	6,000	3,080		
12		1,140	1,010	2,580	1,480	516		2,520	5,430	2,640		
13	1,010	1,040	1,940	2,220	1,250	505	1,850	2,710	6,300	2,580	1,900	
14	1,040	943	5,410	2,110	1,090	512	[a]1,640	2,850	5,300	3,080		
15	943	850	5,240	2,000	987	522	1,430	2,780	3,610	4,040		1,400
16	850	792	11,400	1,950	912	591	[a]1,320	2,710	3,330	4,400		
17	765	765	6,660	3,960	862	760	1,210	2,450	3,930	4,520	1,480	
18	713	738	11,400	7,950	801	1,210	1,170	2,280	3,330	4,280	2,330	
19	665	765	8,760	6,610	749	1,050	[a]1,100	2,110	3,510	3,420	2,060	
20	665	4,380	3,980	3,820	730	1,210	[a]1,100	1,950	3,930	3,420	1,750	
21	850	6,290	2,710	2,520	718	1,660	3,000	1,700	5,160	2,780	1,610	
22	738	3,210	2,340	[a]2,330	718	2,450	2,850	1,560	5,430	2,390	1,850	
23	688	2,160	1,840	[a]2,140	724	2,060	2,640	1,480	4,900	2,330	1,950	
24	713	1,540	1,540	1,950	700	3,080	2,580	1,380	4,040	2,330	1,900	
25	765	1,370	1,410	2,060	688	3,240	2,220	1,300	3,510	2,450	1,800	1,300
26	792	1,140	1,840	1,950	682	2,330	1,950	1,340	3,510	2,450	1,610	
27	821	1,330	6,360	1,850	626	1,850	1,950	1,480	3,330	2,330	1,380	
28	738	1,640	12,900	1,700	615	1,660	2,060	2,000	2,850	2,390	1,300	
29	738	1,460	27,400	1,660	.....	1,610	2,390	2,580	2,850	2,450	1,430	
30	713	1,500	16,800	1,610	.....	1,900	2,640	3,330	3,240	2,390	1,560	
31	765	.....	19,200	1,560	.....	[a]1,800	.....	3,930	.....	2,520	1,800	.....

[a] Estimated or interpolated.

NOTE.—Braced figures show mean discharge for periods indicated, based on flow at stations on Sauk and Skagit rivers.

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Monthly discharge of Baker River below Anderson Creek, near Concrete, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 184 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	.....	665	1,320	7.17	8.27	81,200
November	9,110	738	2,100	11.4	12.72	125,000
December	27,400	911	5,230	28.4	32.74	322,000
January	20,200	1,560	5,280	28.7	33.09	325,000
February	2,160	615	1,240	6.74	7.02	68,900
March	3,240	505	1,180	6.41	7.39	72,600
April	3,000	.....	1,800	9.78	10.91	107,000
May	4,900	1,300	2,460	13.4	15.45	151,000
June	7,780	1,900	4,080	22.2	24.77	243,000
July	4,520	2,330	3,080	16.7	19.25	189,000
August	2,580	1,300	1,850	10.1	11.64	114,000
September	.....	.....	1,400	7.61	8.49	83,300
The year	27,400	505	2,600	14.1	191.74	1,880,000

UPPER COLUMBIA RIVER BASIN.

MAIN STREAM.

COLUMBIA RIVER AT TRAIL, BRITISH COLUMBIA.

LOCATION.—At highway bridge at Trail, 15 miles above international boundary and mouth of Clark Fork and 18 miles below mouth of Kootenai River.

DRAINAGE AREA.—34,000 square miles. (Measured by Hydrometric Survey of British Columbia).

RECORDS AVAILABLE.—April 18, 1913, to September 30, 1918.

GAGE.—Chain gage installed on bridge in June, 1913; read by C. A. Broderick.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Riffle control below gage; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum daily mean stage recorded during year, 38.4 feet June 26 (discharge, 274,000 second-feet); minimum daily mean stage recorded, 8.85 feet March 18 (discharge, 16,200 second-feet).

1913–1918: Maximum stage recorded, 41.6 feet June 14-15, 1913 (discharge, 312,000 second-feet); minimum stage recorded, 7.40 feet March 28, 1917 (discharge, 9,600 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—A small amount of water is diverted above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below and fairly well defined above 150,000 second-feet. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table. Records good for discharge below 100,000 second-feet and fair above.

COOPERATION.—Complete record furnished by Hydrometric Survey of British Columbia.

The following discharge measurement was made by G. K. Beeston:

April 3, 1918: Gage height, 11.02 feet; discharge, 28,100 second-feet.

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Daily discharge, in second-feet, of Columbia River at Trail, British Columbia, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	56,700	36,000	30,100	24,100	23,900	18,000	26,200	67,000	113,000	243,000	140,000	93,200
2	55,400	35,200	30,600	24,600	23,600	18,400	27,000	72,000	114,000	234,000	140,000	91,000
3	54,700	34,600	31,100	25,200	23,300	18,300	27,400	77,900	116,000	222,000	139,000	89,000
4	55,500	34,000	31,200	26,100	23,000	18,200	27,700	84,500	116,000	210,000	136,000	86,800
5	56,900	33,500	30,700	27,500	22,700	18,100	28,800	90,400	116,000	205,000	135,000	84,800
6	58,000	32,900	30,300	29,100	22,500	17,400	29,800	96,000	117,000	200,000	133,000	82,800
7	60,500	32,400	29,900	30,800	22,300	17,400	30,900	102,000	119,000	196,000	131,000	81,000
8	62,800	31,800	29,400	31,400	22,100	17,200	31,900	105,000	122,000	190,000	129,000	79,900
9	63,800	31,100	29,000	31,800	21,900	17,100	33,000	109,000	126,000	188,000	127,000	79,200
10	64,400	30,800	28,600	31,700	21,700	17,000	34,200	110,000	135,000	188,000	125,000	78,300
11	64,800	30,800	28,300	31,400	21,500	16,900	35,300	111,000	148,000	189,000	124,000	77,300
12	64,200	30,400	27,900	31,000	21,300	16,800	36,500	114,000	162,000	190,000	121,000	76,200
13	63,400	29,900	27,700	30,500	21,100	16,700	37,500	116,000	183,000	190,000	116,000	75,000
14	62,400	28,700	27,500	30,100	20,900	16,600	38,700	118,000	203,000	189,000	113,000	74,200
15	60,800	28,100	27,200	29,700	20,700	16,500	39,900	128,000	216,000	188,000	109,000	73,800
16	59,200	27,700	26,900	29,400	20,500	16,400	41,400	130,000	228,000	186,000	106,000	73,400
17	57,500	27,300	26,700	29,200	20,300	16,300	42,300	131,000	236,000	185,000	104,000	73,000
18	55,600	26,900	26,500	29,000	20,000	16,200	43,500	133,000	244,000	184,000	103,000	72,500
19	53,600	26,400	26,300	28,700	19,800	16,300	44,600	134,000	252,000	182,000	102,000	72,000
20	51,600	25,900	26,000	28,300	19,600	16,500	46,100	134,000	257,000	182,000	100,000	71,600
21	49,600	25,300	25,700	27,800	19,400	16,400	47,300	134,000	262,000	182,000	98,600	71,200
22	47,900	25,700	25,200	27,400	19,200	17,400	48,500	134,000	266,000	181,000	97,200	70,700
23	46,400	26,200	24,900	27,000	19,000	18,000	50,100	134,000	268,000	179,000	88,300	70,400
24	44,900	26,700	24,700	26,500	18,800	18,700	51,600	131,000	270,000	177,000	96,000	70,000
25	50,000	27,100	24,500	26,200	18,500	19,500	53,100	125,000	272,000	173,000	96,000	69,500
26	42,500	27,600	24,200	25,900	18,400	20,400	54,700	124,000	274,000	169,000	96,000	69,000
27	41,400	28,100	24,000	25,600	18,200	21,300	56,200	120,000	272,000	164,000	98,800	68,500
28	40,300	28,700	23,900	25,200	18,200	22,300	57,700	114,000	268,000	158,000	97,600	67,900
29	39,200	29,100	23,800	24,900	.....	23,500	59,800	113,000	263,000	152,000	97,600	67,400
30	38,100	29,500	23,600	24,600	.....	24,800	62,800	112,000	252,000	148,000	97,300	67,000
31	37,000	.....	23,800	24,200	.....	26,200	.....	112,000	.....	144,000	95,200	.....

Monthly discharge of Columbia River at Trail, British Columbia, for the year ending Sept. 30, 1918.

[Drainage area, 34,000 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	64,800	37,000	53,500	1.57	1.81	3,290,000
November	36,000	25,300	29,600	.87	.97	1,760,000
December	31,200	23,600	27,100	.80	.92	1,670,000
January	31,800	24,100	27,900	.82	.95	1,720,000
February	23,900	18,200	20,800	.61	.64	1,160,000
March	26,200	16,200	18,400	.54	.62	1,130,000
April	62,800	26,200	41,500	1.22	1.36	2,470,000
May	134,000	67,000	113,000	3.32	3.83	6,950,000
June	274,000	113,000	200,000	5.88	6.56	11,900,000
July	243,000	144,000	186,000	5.47	6.31	11,400,000
August	140,000	88,300	113,000	3.32	3.83	6,950,000
September	93,200	67,000	75,900	2.23	2.49	4,520,000
The year	274,000	16,200	75,600	2.22	30.28	54,900,000

NOTE.—Records published as furnished by Hydrometric Survey of British Columbia.

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COLUMBIA RIVER AT VERNITA, WASH.

LOCATION.—In sec. 11, T. 13 N., R. 24 E., at Richmond ferry, half a mile north of Vernita and 6 miles below Priest Rapids, Benton County.

DRAINAGE AREA.—95,500 square miles. (Areas in United States measured on topographic maps and United States Geological Survey maps, scale 1:500,000. Areas in British Columbia measured on Department of the Interior railway-belt maps, scale 1:500,000; Department of Mines, West Kootenay sheet, scale 1:253,400; and Department of Lands map, 1:1,125,000.)

RECORDS AVAILABLE.—Flood heights only, at Wenatchee, 1894 to 1903; continuous gage-height record at Wenatchee April 18, 1904, to December 31, 1916; at Beverly, January 1–13, 1917; at Vernita, January 14 to September 30, 1918; daily discharge ascertained from May 1, 1913, to September 30, 1918. Gage-height record at Wenatchee published by United States Weather Bureau.

GAGE.—Vertical staff gage in five sections installed on right bank at ferry in October, 1917. Three additional vertical sections installed at same location in March, 1918. All gage readings at Vernita refer to same datum, 388.7 feet above sea level. Gage read by J. P. Richmond.

DISCHARGE MEASUREMENTS.—Made from standard gaging car on ferry cable at Vernita or, when ice conditions are severe, from railroad bridge at Beverly.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. High-water control Coyote Rapids 6 or 7 miles below gage; low-water control riffle noticeable at low stages about three-fourths mile below gage; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 29.15 feet at 8 p. m. June 25 (discharge, 432,000 second-feet; minimum stage recorded, 2.49 feet at 5 p. m. November 24 (discharge, 41,200 second-feet).

1913–1918: Maximum stage recorded, 45.7 feet at Wenatchee, June 15 and 16, 1913 (discharge, 528,000 second-feet). Minimum discharge, 23,900 second-feet (current-meter measurement) January 31, 1917, during period in which stage-discharge relation was affected by ice.

Maximum stage recorded at Wenatchee by Weather Bureau and Great Northern Railway Co., 58.0 feet June 7, 1894 (discharge estimated, by extending rating curve, at 710,000 second-feet).

ICE.—Stage-discharge relation affected by ice except during mild winters. Flow estimated from discharge measurements, observer's notes, and weather records.

DIVERSIONS.—Some water is diverted for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage-height to rating table. Records excellent.

COOPERATION.—Maintained in cooperation with Washington Irrigation & Development Co.

Discharge measurements of Columbia River at Vernita, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	John McCombs	6.12	68,400	Feb. 7	T. R. Newell	5.67	63,700
Dec. 4	T. R. Newell	2.99	44,100	21	do	5.09	59,800
5	do	3.04	44,800	Mar. 14	do	3.16	44,400
Jan. 22	do	8.54	88,200	Apr. 20	do	10.70	109,000
23	do	8.36	87,800	May 14	R. B. Kilgore	20.38	237,000

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Daily discharge, in second-feet, of Columbia River at Vernita, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	77,500	53,800	43,100	92,000	71,400	49,700	69,700	152,000	234,000	405,000	200,000	124,000
2	76,600	53,100	43,100	102,000	69,700	49,700	73,100	157,000	234,000	391,000	194,000	122,000
3	75,700	51,700	43,800	105,000	68,000	49,700	74,800	169,000	234,000	380,000	190,000	119,000
4	75,700	51,000	44,400	111,000	65,400	49,700	76,600	179,000	229,000	366,000	187,000	117,000
5	74,000	51,000	44,400	117,000	64,600	49,700	78,400	188,000	227,000	354,000	185,000	115,000
6	73,100	50,300	44,400	119,000	63,800	49,700	79,300	196,000	227,000	339,000	185,000	113,000
7	73,100	49,700	45,100	119,000	63,800	49,000	80,200	208,000	229,000	328,000	184,000	110,000
8	74,000	49,000	44,400	120,000	65,400	48,400	80,200	213,000	236,000	315,000	181,000	107,000
9	75,700	48,400	43,800	119,000	64,600	47,000	81,100	219,000	245,000	302,000	176,000	105,000
10	78,400	47,700	43,800	118,000	64,600	46,400	82,900	222,000	254,000	294,000	172,000	103,000
11	81,100	47,000	43,100	117,000	63,800	46,400	85,600	227,000	268,000	288,000	168,000	101,000
12	81,100	46,400	42,500	115,000	64,600	45,700	88,300	231,000	282,000	282,000	165,000	99,700
13	82,000	46,400	42,500	112,000	63,800	45,100	93,000	236,000	298,000	280,000	162,000	98,700
14	82,000	46,400	42,500	111,000	63,800	45,700	96,800	243,000	321,000	278,000	158,000	97,800
15	82,000	45,700	43,800	109,000	63,800	45,700	101,000	252,000	341,000	278,000	154,000	95,800
16	80,200	44,400	44,400	105,000	63,800	46,400	103,000	259,000	364,000	276,000	150,000	94,900
17	78,400	43,800	44,400	103,000	63,000	47,000	106,000	267,000	377,000	274,000	145,000	94,000
18	77,000	43,100	45,700	101,000	62,200	47,000	107,000	272,000	389,000	268,000	142,000	94,000
19	75,700	43,100	55,200	97,800	61,400	47,000	109,000	274,000	400,000	265,000	138,000	93,000
20	73,100	42,500	54,500	94,900	59,800	47,000	110,000	272,000	407,000	263,000	134,000	91,100
21	70,600	41,300	51,700	91,100	59,000	48,400	112,000	272,000	414,000	261,000	133,000	91,100
22	68,800	41,900	50,300	89,200	57,400	49,000	116,000	272,000	421,000	259,000	131,000	90,200
23	67,200	41,300	48,400	87,400	55,200	49,700	122,000	268,000	426,000	259,000	130,000	89,200
24	66,300	41,300	52,400	85,600	52,400	49,700	126,000	267,000	428,000	255,000	128,000	88,300
25	63,800	41,300	54,500	83,800	51,000	51,700	131,000	263,000	430,000	252,000	127,000	88,300
26	63,000	41,900	55,900	82,000	51,700	53,800	133,000	255,000	430,000	245,000	126,000	88,300
27	61,400	41,900	57,400	81,100	51,700	55,200	137,000	250,000	430,000	239,000	125,000	88,300
28	59,000	41,900	63,000	79,300	50,300	58,200	138,000	245,000	428,000	231,000	125,000	88,300
29	57,400	42,500	68,800	78,400	.....	61,400	142,000	238,000	423,000	222,000	126,000	87,400
30	55,900	42,500	85,600	77,500	.....	63,000	145,000	234,000	416,000	214,000	126,000	86,500
31	55,200	.....	89,200	74,000	.....	66,300	.....	234,000	.....	206,000	125,000	.....

Monthly discharge of Columbia River at Vernita, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 95,500 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	82,000	55,200	72,100	0.755	0.87	4,430,000
November	53,800	41,300	45,700	.479	.53	2,720,000
December	89,200	42,500	50,800	.532	.61	3,120,000
January	120,000	74,000	99,900	1.05	1.21	6,140,000
February	71,400	50,300	61,400	.643	.67	3,410,000
March	66,300	45,100	50,300	.527	.61	3,090,000
April	145,000	69,700	103,000	1.08	1.20	6,130,000
May	274,000	152,000	233,000	2.44	2.81	14,300,000
June	430,000	227,000	335,000	3.51	3.92	19,900,000
July	405,000	206,000	286,000	2.99	3.45	17,600,000
August	200,000	125,000	154,000	1.61	1.86	9,470,000
September	124,000	86,500	99,400	1.04	1.16	5,910,000
The year	430,000	41,300	133,000	1.39	18.90	96,200,000

KOOTENAI RIVER BASIN.

KOOTENAI RIVER AT LIBBY, MONT.

LOCATION.—In sec. 3, T. 30 N., R. 31 W., at highway bridge opposite Great Northern Railway station at Libby, Lincoln County.

DRAINAGE AREA.—11,000 square miles.

RECORDS AVAILABLE.—October 13, 1910, to September 30, 1918.

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GAGE.—Chain gage on left span of highway bridge; prior to completion of bridge a temporary staff gage fastened to an old stump on the right bank at lower side of bridge. In February, 1913, gage datum lowered 2 feet; all readings prior to change reduced to new datum.

DISCHARGE MEASUREMENTS.—Made from highway bridge; prior to erection of bridge from ferry cable.

CHANNEL AND CONTROL.—Bed of stream composed of small rocks; permanent. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.27 feet at 5.30 p. m. June 13 (discharge, 77,000 second-feet); minimum stage, 1.69 feet December 14 (discharge, 1,960 second-feet).

1910–1918: Maximum stage, 19.17 feet June 21, 1916 (discharge, 130,000 second-feet); minimum stage, 1.4 feet February 7, 1914 (discharge, 1,480 second-feet). (Previously published as 1,690 second-feet.)

ICE.—Stage-discharge relation may have been slightly affected by ice for short periods during winter but the open channel rating table has been applied.

DIVERSIONS.—None of importance.

REGULATION.—None.

ACCURACY.—Stage-discharge relation unchanged since 1910 for open-water flow; slightly affected by ice. Rating curve well-defined between 3,400 and 25,000 second-feet and fairly well defined above 25,000 second-feet. Gage read to hundredths twice daily during May and June and once daily at other times. Daily discharge ascertained by applying mean daily gage height to rating table for open channel. Records good except for short periods during winter when there may have been slight ice effect on stage-discharge relation.

COOPERATION.—Gage-height records furnished by United States Forest Service.

Daily discharge, in second-feet, of Kootenai River at Libby, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1...	6,250	3,880	3,760	11,100	2,900	[a] 3,890	9,170	17,000	24,600	21,700	12,200	[a] 8,680
2...	6,190	3,920	[a] 3,760	13,700	2,290	[a] 3,830	8,470	20,800	[a] 23,800	21,400	12,100	[a] 8,740
3...	6,120	3,880	3,760	11,200	[a] 2,780	[a] 3,770	7,400	24,400	23,000	21,700	12,100	[a] 8,810
4...	5,280	[a] 3,920	3,800	10,000	3,270	3,710	6,940	29,800	21,200	21,400	12,400	8,880
5...	5,520	[a] 3,950	3,530	9,210	3,710	3,480	6,440	[a] 33,300	19,800	20,400	12,500	7,790
6...	5,760	[a] 3,980	3,310	[a] 8,850	4,000	3,480	6,560	36,800	21,400	18,500	12,100	7,260
7...	6,120	[a] 4,020	3,100	7,490	4,400	3,350	[a] 6,720	32,600	23,400	[a] 19,000	11,400	7,130
8...	6,310	3,120	2,470	6,910	4,500	3,350	6,880	28,000	28,400	19,500	10,800	6,880
9...	6,190	[a] 3,640	[a] 2,540	5,910	4,300	3,350	7,260	23,700	[a] 39,900	19,800	10,400	6,690
10...	5,700	4,170	2,620	4,910	[a] 4,380	[a] 3,310	8,680	21,300	51,400	19,800	10,300	6,750
11...	5,580	[a] 4,120	4,040	4,270	4,450	3,270	7,200	24,200	66,800	20,500	[a] 10,400	6,750
12...	5,460	[a] 4,070	[a] 3,430	4,020	4,450	3,350	11,800	[a] 21,600	[a] 71,200	21,900	10,400	6,690
13...	5,280	[a] 4,020	2,820	[a] 3,860	4,450	3,100	12,300	19,100	75,600	20,100	10,100	6,500
14...	4,560	3,970	1,960	3,690	4,000	3,440	[a] 12,400	22,600	74,400	19,200	10,900	6,560
15...	4,970	3,970	2,590	3,600	3,660	3,400	12,400	27,200	75,600	18,000	10,500	6,560
16...	4,910	3,920	[a] 3,300	3,830	3,350	3,270	11,600	30,800	[a] 70,500	17,300	10,400	6,340
17...	4,880	3,730	4,000	3,970	[a] 3,460	3,510	10,700	30,000	65,400	17,000	10,300	6,310
18...	5,050	[a] 3,600	4,770	4,430	3,570	3,800	10,100	29,000	57,800	16,700	[a] 10,400	6,340
19...	4,830	3,460	7,400	4,370	3,900	4,240	9,390	[a] 26,000	55,300	16,800	10,400	6,220
20...	4,560	[a] 3,460	8,540	[a] 4,220	2,290	4,750	8,570	23,000	52,500	16,600	10,500	6,190
21...	[a] 4,610	3,460	5,520	4,070	2,250	4,610	10,700	20,600	[a] 48,300	[a] 16,400	10,300	6,060
22...	4,660	3,460	5,050	4,120	[a] 2,280	4,560	12,900	19,400	44,100	16,100	9,990	6,190
23...	4,450	3,510	[a] 4,830	3,830	2,320	6,190	14,800	18,100	[a] 44,000	15,000	9,690	6,310
24...	4,400	3,780	4,610	4,020	[a] 3,060	[a] 6,250	15,300	17,200	44,000	13,900	[a] 9,540	6,440
25...	4,400	[a] 3,900	4,100	4,020	3,800	6,310	15,700	16,400	41,300	13,400	[a] 9,390	6,620
26...	4,240	4,020	3,760	4,020	3,800	7,400	15,100	[a] 15,600	39,300	13,500	9,240	7,010
27...	4,350	4,070	3,100	[a] 3,760	4,000	4,770	13,800	14,700	35,000	13,300	9,170	6,690
28...	[a] 4,280	[a] 3,980	2,740	3,510	[a] 3,950	4,830	13,400	14,200	30,400	13,500	9,170	6,190
29...	4,200	3,880	3,100	3,420	.....	4,660	13,400	14,000	25,900	13,200	9,100	6,090
30...	4,040	4,020	[a] 5,770	3,120	.....	4,610	14,700	[a] 16,400	[a] 28,800	12,700	8,540	5,820
31...	4,000	.....	[a] 8,430	2,300	.....	[a] 6,890	.....	18,700	.....	12,400	[a] 8,610	.....

[a] Gage not read; discharge interpolated.

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Monthly discharge of Kootenai River at Libby, Mont., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	6,310	4,000	5,070	312,000
November	4,170	3,120	3,820	228,000
December	8,540	1,960	4,080	251,000
January	13,700	2,300	5,480	337,000
February	4,500	2,250	3,560	198,000
March	7,400	3,100	4,280	263,000
April	15,780	6,440	10,700	637,000
May	36,800	14,000	22,800	1,400,000
June	75,600	19,800	44,100	2,620,000
July	21,900	12,400	17,400	1,070,000
August	12,500	8,540	10,400	640,000
September	8,880	5,820	6,850	408,000
The year	75,600	1,960	11,600	8,360,000

CLARK FORK BASIN.

CLARK FORK AT ST. REGIS, MONT.

LOCATION.—In sec. 19, T. 18 N., R. 27 W., at McLeod's ferry at St. Regis, half a mile below mouth of St. Regis River, Mineral County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 26, 1910, to September 30, 1918.

GAGE.—Vertical staff in four sections on left bank at old ferry landing; read by Archie McLeod.

DISCHARGE MEASUREMENTS.—Made from ferry cable at gage prior to 1918; afterward from highway bridge above mouth of St. Regis River. Flow of St. Regis River added to obtain flow passing the gage.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; practically permanent. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.7 feet, June 14 (discharge, 48,400 second-feet); minimum stage recorded, 4.6 feet December 14 and February 1 (discharge, 3,160 second-feet).

1910–1918: Maximum stage recorded, 19.1 feet May 30–31, 1913 (discharge, 62,800 second-feet); minimum stage recorded, 2.9 feet January 4, 1912 (discharge, 1,710 second-feet).

ICE.—Stage-discharge relation slightly affected by ice; open channel rating applied throughout winter.

DIVERSIONS.—Water diverted from several tributaries to irrigate land in Bitterroot Valley and vicinity of Missoula.

REGULATION.—Practically none.

ACCURACY—Stage-discharge relation practically permanent, except for possibly slight effect of ice for short periods during winter. Rating curve well defined between 2,000 and 65,000 second-feet. Gage read once daily to nearest tenth. Daily discharge ascertained by applying gage height to rating table. Records good.

The following discharge measurement was made by W. A. Lamb:

September 24, 1918: Gage height, 4.94 feet; discharge, 3,660 second-feet.

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Daily discharge, in second-feet, of Clark Fork at St. Regis, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,230	3,850	4,040	22,600	3,160	4,620	12,600	21,000	21,000	13,200	5,680	4,620
2	4,040	4,230	4,040	21,400	3,670	4,620	12,000	44,500	29,300	12,300	5,460	4,820
3	4,040	4,420	4,230	21,400	4,420	4,620	11,700	26,300	25,000	11,400	5,460	4,620
4	3,850	4,420	4,420	[a]19,200	5,240	4,820	11,100	30,700	17,700	10,800	5,030	4,230
5	3,850	5,030	4,420	17,000	5,900	4,820	10,800	36,000	23,000	10,200	5,240	4,230
6	3,850	4,420	3,670	15,600	6,560	4,820	10,500	36,500	23,800	9,700	5,460	4,230
7	3,670	4,420	3,670	11,400	6,780	4,620	10,500	38,000	27,600	9,200	5,460	4,040
8	3,670	4,230	3,670	13,200	7,000	4,820	11,400	34,000	31,600	8,200	5,680	4,040
9	3,670	4,230	3,490	12,600	6,780	4,620	12,900	31,600	36,000	7,480	5,460	4,040
10	3,670	4,040	3,490	11,100	6,240	4,820	12,900	27,600	40,600	7,960	5,240	3,670
11	3,670	4,040	3,320	9,700	6,120	4,820	14,500	25,900	45,000	7,720	5,460	3,850
12	3,670	3,850	3,320	8,450	6,340	5,030	15,900	23,800	46,700	7,480	5,460	3,670
13	3,490	4,040	3,490	8,700	6,120	5,030	15,900	23,800	47,800	7,480	5,240	3,670
14	3,490	4,420	3,160	9,200	6,120	5,240	21,000	24,200	48,400	7,240	5,460	3,670
15	3,490	4,230	3,490	8,700	5,900	5,240	21,000	26,700	47,800	7,240	5,460	3,850
16	3,490	3,850	3,850	8,700	5,240	5,030	16,600	27,600	46,200	7,480	5,240	3,850
17	3,490	3,670	4,420	8,200	5,030	5,030	15,900	27,600	46,600	7,720	5,240	4,230
18	3,490	3,670	6,120	8,200	5,030	4,420	14,800	26,700	35,500	7,720	5,680	4,230
19	3,490	3,490	11,700	8,450	4,820	6,120	14,200	25,400	33,100	7,240	6,340	4,040
20	3,490	3,490	12,000	7,960	4,230	6,560	13,800	23,800	31,600	7,000	6,560	3,850
21	3,490	3,490	10,800	7,480	4,620	6,780	14,200	23,000	29,300	6,780	7,000	3,850
22	3,490	3,490	9,970	7,000	5,240	7,000	14,800	21,800	27,200	6,560	7,000	3,670
23	3,490	3,490	12,000	7,000	4,420	7,960	17,000	21,800	25,400	6,340	7,240	3,670
24	3,490	3,670	11,400	7,000	5,030	8,700	18,000	21,400	23,800	6,120	6,780	3,850
25	3,490	3,490	10,800	7,000	5,240	10,200	34,000	21,800	23,000	5,900	6,780	4,230
26	[a]3,610	3,490	9,450	7,240	4,820	10,800	34,000	21,400	21,000	5,900	6,120	4,420
27	[a]3,730	3,490	9,700	6,780	5,030	12,000	29,300	21,000	29,300	6,120	5,900	4,230
28	3,850	3,490	14,200	6,340	5,030	12,300	21,000	17,000	17,000	6,340	5,460	4,230
29	3,850	3,670	21,000	6,560	.....	12,000	21,000	16,200	15,600	6,340	5,460	4,230
30	3,490	4,040	23,000	6,340	.....	12,000	34,000	15,900	14,500	6,120	5,460	4,040
31	3,490	.....	23,800	4,040	.....	12,000	.....	16,600	.....	5,900	4,820	.....

[a] Gage not read; discharge interpolated.

Monthly discharge of Clark Fork at St. Regis, Mont., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4,230	3,490	3,650	224,000
November	5,030	3,490	3,930	234,000
December	23,800	3,160	8,070	496,000
January	22,600	4,040	10,500	646,000
February	7,000	3,160	5,370	298,000
March	12,300	4,420	6,820	419,000
April	34,000	10,500	17,200	1,020,000
May	44,500	15,900	25,800	1,590,000
June	48,400	14,500	30,800	1,830,000
July	13,200	5,900	7,840	482,000
August	7,240	4,820	5,750	354,000
September	4,820	3,670	4,060	242,000
The year	48,400	3,160	10,800	7,840,000

CLARK FORK NEAR PLAINS, MONT.

LOCATION.—In lot 7, sec. 7, T. 19 N., R. 26 W., at Cooper's ferry 3 miles above Plains and 7 miles below mouth of Flathead River, Sanders County.

DRAINAGE AREA.—19,900 square miles.

RECORDS AVAILABLE.—October 28, 1910, to September 30, 1918.

GAGE.—Barrett & Lawrence water-stage recorder, installed November 28, 1911, at point 50 feet below chain gage, used previously and referred to same datum; inspected by A. L. Steiner.

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Discharge measurements.—Made from cable installed April 26, 1917.

Channel and control.—Bed composed of boulders and gravel; permanent. No well-defined control. Banks not subject to overflow.

Extremes of discharge.—Maximum stage during year from water-stage recorder, 16.45 feet at 11 a. m. June 16 (discharge, 100,000 second-feet); minimum stage, 3.95 feet at 8 a. m. December 14 (discharge, 5,780 second-feet).

1910–1918: Maximum stage recorded, 17.9 feet June 5, 1913, and July 2, 1916 (discharge, 115,000 second-feet); minimum stage recorded, 3.6 feet March 9–10, 1913 (discharge, 5,290 second-feet).

Ice.—Stage-discharge relation not seriously affected by ice; open channel rating curve used during winter.

Diversions.—Numerous diversions are made for irrigation from the headwaters of Clark Fork and tributaries of Flathead River.

Regulation.—Flathead Lake furnishes natural regulation for part of flow.

Accuracy.—Stage-discharge relation permanent. Rating curve well defined between 5,500 and 60,000 second-feet and fairly well defined above 60,000 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph. Records good.

The following discharge measurement was made by W. A. Lamb:

September 23, 1918: Gage height, 4.76 feet; discharge, 8,640 second-feet.

Daily discharge, in second-feet, of Clark Fork near Plains, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9,210	8,000	6,890	28,900	10,900	10,900	19,100	39,800	47,200	57,100	18,600	13,200
2	9,210	8,000	6,890	29,600	10,500	10,900	19,600	43,800	47,200	54,300	18,100	13,200
3	8,800	8,400	7,250	28,900	11,800	10,900	19,100	48,100	47,200	50,800	18,100	12,800
4	8,800	8,400	7,250	28,200	12,800	10,900	18,600	54,300	47,200	49,000	17,600	12,300
5	8,800	8,400	7,250	27,500	14,200	10,900	18,100	61,600	48,100	46,400	17,100	12,300
6	8,800	8,000	6,890	26,200	14,600	10,900	18,100	67,200	51,600	44,700	17,100	11,800
7	8,800	8,000	6,890	25,500	15,600	10,900	18,100	69,100	57,100	42,200	17,100	11,800
8	8,800	8,000	6,890	24,800	16,100	10,500	18,100	68,200	62,600	40,600	16,600	11,400
9	8,800	7,620	6,890	24,800	15,600	10,500	18,600	67,200	68,200	39,000	16,600	11,400
10	8,800	7,620	6,890	24,800	14,600	10,500	20,200	64,400	74,800	36,600	16,100	10,900
11	8,800	7,620	6,540	24,800	14,200	10,100	21,800	61,600	80,600	35,800	16,100	10,900
12	8,800	8,000	6,540	24,200	13,700	10,500	23,600	58,900	87,400	34,200	15,600	10,500
13	8,400	8,000	6,540	23,000	13,700	10,500	24,200	58,000	92,400	33,400	15,000	10,500
14	8,000	7,620	5,850	20,700	13,700	10,900	26,200	58,000	96,400	31,800	15,600	10,500
15	7,620	7,250	6,890	20,700	13,200	10,500	28,200	60,700	98,400	31,100	15,600	9,630
16	7,620	7,250	7,250	20,200	11,800	10,500	28,200	63,500	99,500	30,400	15,100	9,630
17	7,620	6,890	7,250	19,600	11,800	10,500	28,200	64,400	95,400	28,900	15,100	9,630
18	7,620	6,890	8,800	19,100	11,400	10,500	28,200	63,500	89,400	28,900	15,100	9,210
19	7,620	6,890	14,200	19,100	12,800	11,400	27,500	62,600	88,400	27,500	15,100	9,210
20	7,620	6,890	16,100	18,600	12,800	11,800	26,900	60,700	87,400	26,200	15,100	9,210
21	7,620	6,890	15,600	18,100	12,800	12,300	27,500	58,900	85,400	24,800	15,600	8,800
22	7,620	6,540	14,600	17,600	12,800	12,800	28,900	57,100	82,500	24,200	16,100	8,800
23	7,620	6,890	16,100	17,100	12,300	13,200	31,100	54,300	79,600	23,600	15,600	8,800
24	7,620	6,890	16,600	17,100	11,800	14,200	32,600	52,500	77,700	23,600	15,100	8,800
25	7,620	6,890	16,100	17,100	12,800	15,600	34,200	51,600	75,800	22,400	15,100	8,800
26	7,620	6,890	14,200	17,100	11,800	16,600	35,800	50,800	72,900	21,800	14,600	9,210
27	7,620	6,890	14,200	17,100	11,800	17,600	35,000	49,000	69,100	21,200	14,200	9,210
28	8,000	6,540	18,100	16,600	11,400	18,100	35,000	48,100	66,300	20,700	13,700	9,210
29	8,000	6,540	21,800	16,100	.....	18,100	35,800	46,400	63,500	20,700	13,700	8,800
30	8,000	6,890	26,200	15,600	.....	18,100	36,600	44,700	60,700	20,200	13,200	8,800
31	8,000	.....	29,600	12,800	.....	18,100	.....	44,700	.....	19,600	13,200	.....

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Monthly discharge of Clark Fork near Plains, Mont., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9,210	7,620	8,190	504,000
November	8,400	6,540	7,390	440,000
December	29,600	5,850	11,600	713,000
January	29,600	12,800	21,300	1,310,000
February	16,100	10,500	13,000	722,000
March	18,100	10,100	12,600	775,000
April	36,600	18,100	26,100	1,550,000
May	69,100	39,800	56,600	3,480,000
June	99,500	47,200	73,300	4,360,000
July	57,100	19,600	32,600	2,000,000
August	18,600	13,200	15,700	965,000
September	13,200	8,800	10,300	613,000
The year	99,500	5,850	24,100	17,400,000

PEND OREILLE LAKE AT SANDPOINT, IDAHO.

LOCATION.—In sec. 23, T. 57 N., R. 2 W. Boise meridian, on west side of lake, at municipal wharf at Sandpoint, Bonner County.

DRAINAGE AREA.—22,900 square miles (measured on British Columbia Department of Lands map, scale 1:1,125,000; and United States Geological Survey maps, scale 1 :500,000).

RECORDS AVAILABLE.—March 18, 1914, to September 30, 1918.

GAGE.—Vertical staff in two sections on pile at municipal wharf; read by A. B. Howard.

EXTREMES OF STAGE.—Maximum stage recorded during year, 21.20 feet June 21; minimum stage recorded, 5.03 feet November 30.

1914–1918: Maximum stage recorded 26 feet July 6, 1916; minimum stage recorded 4.95 feet March 16, 1917.

ICE.—Ice at gage renders observations difficult.

DIVERSIONS.—Considerable water diverted from tributaries of Clark Fork for irrigation.

REGULATION.—None.

COOPERATION.—Record furnished by United States Forest Service.

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Daily gage height, in feet, of Pend Oreille Lake at Sandpoint, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.83	5.22								19.50		
2	5.81	5.21				7.00	8.60					6.90
3	5.80	5.20		11.20				13.30	15.50		9.02	
4	5.79		5.10		8.00				15.50			
5	5.78	5.19			7.90		8.90			18.80	9.00	
6	5.77	5.18										
7		5.17	5.15	11.75				15.35				6.80
8	5.70	5.17			8.10		8.99		15.80			
9	5.67	5.16				6.80				15.08	8.80	6.80
10	5.65	5.15		11.50								
11	5.60		5.16		8.20			16.80	16.95			
12	5.58	5.14								13.07	8.03	
13	5.55	5.14					9.75					
14		5.13	5.18	10.85	8.00	6.70		17.05	18.80			6.40
15	5.50	5.12										
16	5.45	5.12				6.50	10.50			13.60	8.00	
17	5.43	5.11		10.40				17.50	20.20			6.10
18	5.41		5.40									
19	5.40					6.70	10.85					
20	5.39	5.09								12.09	7.80	6.00
21			6.25	9.85				17.70	21.20			
22	5.37						11.10					
23	5.35	5.07			7.30					11.05		
24	5.32			9.50				17.30			7.70	5.80
25	5.31						11.70	17.10				
26	5.30					7.40			20.75		7.70	
27	5.28	5.05	7.00					16.70		9.90		
28				9.15								5.80
29	5.25					8.00			19.65	10.00		
30	5.24	5.03					12.50					
31	5.23			9.00				15.95			7.80	

CLARK FORK AT METALINE FALLS, WASH.

LOCATION.—In SE. ¼ sec. 21, T. 39 N., R. 43 E., three-eighths of a mile above Metaline Falls, opposite town of Metaline Falls, Pend Oreille County, 11 miles above international boundary.

DRAINAGE AREA.—25,100 square miles. (Areas in United States measured on United States Geological Survey maps, scale 1:500,000; area of Flathead River in British Columbia measured on Department of Lands map, scale 1:1,125,000; area of Priest River in British Columbia measured on British Columbia map, Nelson sheet.)

RECORDS AVAILABLE.—November 4, 1908, to September 4, 1910 (gage heights only; data insufficient for determination of discharge); October 1, 1912, to September 30, 1918.

GAGE.—Vertical and inclined staff reading from 0 to 55 feet, on right bank; installed December 10, 1916; read by M. C. Helmer, W. A. Snure, and C. N. West. Previous gages as follows: November 4, 1908, to September 4, 1910, on right bank about three-quarters of a mile above falls; October 1 to December 27, 1912, on right bank just below Sullivan Creek, 500 feet above falls; January 16, 1913, to January 24, 1914, at same site but at different datum; January 25 to February 2, 1914, temporary gage at different datum; February 12, 1914, to December 9, 1916, vertical and inclined staff on right bank 500 feet above the falls and at different datum. All readings from October 1, 1912, to February 2, 1914, reduced to datum of gage installed February 12, 1914. Although some gages were above Sullivan Creek their records give flow below Sullivan Creek by the addition of measured flow of creek.

DISCHARGE MEASUREMENTS.—Made from cable near gage. Flow of Sullivan Creek added to flow measured at cable.

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CHANNEL AND CONTROL.—Sensitive control formed by Metaline Falls, where water surface drops 20 feet in a distance of 1,200 feet; slightly shifting. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 31.55 feet June 24 (discharge, 99,100 second-feet); minimum stage recorded, 2.98 feet November 26 (discharge, 9,040 second-feet).

1912–1918: Maximum stage recorded, 41.2 feet June 16, 1913 (discharge, 139,000 second-feet); minimum stage recorded, 0.10 foot December 27, 1916 (discharge, 5,960 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Numerous small diversions from upper tributaries for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation for stages below 29 feet (86,700 second-feet) changed January 6. Rating curves well defined. Gage read to half-tenths once daily. No diurnal fluctuation. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

COOPERATION.—Station maintained in cooperation with Hydrometric Survey of British Columbia. Gage-height record furnished by Hugh L. Cooper Co.

Discharge measurements of Clark Fork at Metaline Falls, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 2	R. B. Kilgore	18.80	43,400	July 1	L. D. Carson	29.25	89,300
4	do	19.89	46,300	2	do	28.75	85,600

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Daily discharge, in second-feet, of Clark Fork at Metaline Falls, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1....	11,700	9,800	9,210	24,700	23,200	17,000	21,400	41,900	63,600	88,100	28,800	16,800
2....	11,700	9,800	9,070	28,600	21,900	17,000	22,800	43,100	62,700	85,800	28,100	16,600
3....	11,500	9,950	9,070	32,200	21,000	16,800	23,600	44,100	61,800	82,900	26,200	16,200
4....	11,700	9,950	9,070	35,100	20,400	16,400	23,900	46,400	61,400	79,200	25,700	15,800
5....	11,700	9,950	9,070	36,800	20,200	15,800	24,100	47,800	60,900	76,800	25,500	15,500
6....	11,700	9,800	9,210	38,500	20,000	15,800	24,100	50,800	60,400	74,500	25,000	15,100
7....	11,500	9,650	9,210	36,600	20,200	15,500	24,600	54,400	60,900	71,300	24,600	14,800
8....	11,500	9,650	9,210	37,100	19,800	15,500	24,800	58,200	60,900	68,600	23,900	14,600
9....	11,500	9,650	9,210	36,800	20,200	15,500	25,200	62,700	62,700	65,800	23,200	14,200
10....	11,400	9,650	9,210	37,400	20,200	15,300	25,500	65,400	64,000	63,200	22,500	14,000
11....	11,200	9,650	9,210	36,800	20,400	15,100	25,700	67,200	66,300	60,000	22,300	13,700
12....	11,200	9,650	9,210	36,600	20,400	15,100	26,400	68,600	69,500	58,200	22,100	13,500
13....	11,200	9,650	9,350	35,500	20,600	14,900	27,400	69,900	73,600	55,700	21,600	13,300
14....	11,200	9,650	9,350	34,600	20,200	15,100	28,400	69,900	78,200	53,600	21,200	13,000
15....	10,900	9,650	9,350	33,300	20,600	15,100	29,300	71,800	81,100	51,600	21,000	12,800
16....	10,900	9,650	9,500	32,800	20,200	15,100	30,000	71,800	84,800	50,000	20,200	12,700
17....	10,600	9,350	9,650	32,300	20,000	14,900	31,300	72,700	88,600	47,500	19,800	12,500
18....	10,600	9,350	9,950	31,800	19,800	15,100	32,000	73,600	92,400	45,700	19,400	12,200
19....	10,400	9,210	10,100	30,800	19,400	15,300	32,800	74,500	94,300	40,600	19,000	12,000
20....	10,200	9,070	10,400	30,000	18,200	15,500	33,300	75,000	96,200	42,200	19,000	12,000
21....	10,200	9,070	10,900	29,300	16,200	15,100	33,300	75,500	98,200	40,600	18,800	11,800
22....	10,200	9,070	11,400	28,400	16,000	15,600	34,100	75,500	98,200	39,100	18,600	11,700
23....	10,100	9,070	12,400	27,900	16,800	15,600	34,600	74,500	98,600	38,000	18,400	11,500
24....	9,950	9,070	13,400	27,400	16,600	16,000	36,000	73,600	99,100	36,800	18,200	11,300
25....	9,800	9,070	14,500	26,900	16,200	16,800	36,000	72,700	98,200	35,700	18,000	11,200
26....	9,650	9,070	15,800	26,200	15,500	17,600	37,700	71,800	97,200	34,400	17,800	11,000
27....	9,650	9,070	16,600	26,000	16,200	18,200	38,600	70,900	96,200	33,600	17,400	11,000
28....	9,650	9,070	17,000	25,200	17,000	18,600	39,400	69,000	94,300	32,800	17,400	11,000
29....	9,650	9,070	17,900	24,600	.....	19,400	40,300	68,100	92,800	31,500	17,000	11,000
30....	9,650	9,070	19,500	24,600	.....	20,400	41,200	66,300	90,500	30,500	17,000	11,000
31....	9,800	.....	21,500	24,600	.....	21,000	.....	64,500	.....	29,800	16,800	.....

Monthly discharge of Clark Fork at Metaline Falls, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 25,100 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	11,700	9,650	10,700	0.426	0.49	658,000
November	9,950	9,070	9,450	.376	.42	562,000
December	21,500	9,070	11,600	.462	.53	713,000
January	38,500	24,600	31,300	1.25	1.44	1,920,000
February	23,200	15,500	19,200	.765	.80	1,070,000
March	21,000	14,900	16,300	.649	.75	1,000,000
April	41,200	21,400	30,300	1.21	1.35	1,800,000
May	75,500	41,900	64,900	2.59	2.99	3,990,000
June	99,100	60,400	80,300	3.20	3.57	4,780,000
July	88,100	29,800	53,000	2.11	2.43	3,260,000
August	28,800	16,800	21,100	.841	.97	1,300,000
September	16,800	11,000	13,100	.522	.58	780,000
The year	99,100	9,070	30,200	1.20	16.32	21,800,000

FLATHEAD LAKE AT POLSON, MONT.

LOCATION.—At steamboat dock on southern extremity of lake at Polson, Flathead County.

RECORDS AVAILABLE.—August 23, 1908, to September 30, 1918.

GAGE.—Vertical staff attached to a pile at end of pier; datum 2,803.00 feet above sea level. (Prior to 1917 this datum was given as 2,800 feet above sea level.)

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EXTREMES OF STAGE.—Maximum stage recorded during year, 90.3 feet June 17–20; minimum stage recorded, 79.0 feet December 16.

1908–1918: Maximum stage recorded, 92.7 feet July 1, 2, and 4, 1916; minimum, 78.5 feet February 16–22, 1913.

COOPERATION.—Gage heights furnished by United States Reclamation Service.

Daily gage height, in feet, of Flathead Lake at Polson, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	80.0	79.35	79.15	80.0	81.0	80.05	80.1	83.6	85.4	87.9	82.2	80.7
2	79.95	79.35	79.1	80.2	80.95	80.0	80.2	83.8	85.5	87.6	82.1	80.7
3	79.95	79.35	79.1	80.5	80.9	80.0	80.3	84.0	85.6	87.2	82.0	80.6
4	79.9	79.3	79.1	80.8	80.85	80.0	80.4	84.2	85.6	86.9	81.9	80.6
5	79.9	79.3	79.1	81.1	80.8	80.0	80.5	84.55	85.6	86.6	81.8	80.6
6	79.85	79.3	79.1	81.3	80.75	79.95	80.6	85.25	85.6	86.3	81.8	80.5
7	79.85	79.3	79.1	81.5	80.7	79.95	80.7	85.9	85.75	86.1	81.7	80.5
8	79.8	79.3	79.1	81.7	80.7	79.95	80.8	86.15	86.0	85.8	81.7	80.5
9	79.8	79.3	79.05	81.9	80.7	79.95	80.9	86.35	86.3	85.6	81.6	80.4
10	79.75	79.3	79.05	81.9	80.65	79.9	81.0	86.55	86.9	85.2	81.6	80.4
11	79.75	79.25	79.05	81.9	80.65	79.9	81.1	86.5	87.5	85.2	81.5	80.4
12	79.7	79.25	79.05	81.85	80.6	79.9	81.2	86.35	88.1	84.9	81.5	80.3
13	79.7	79.25	79.05	81.85	80.6	79.9	81.3	86.3	88.7	84.8	81.4	80.3
14	79.65	79.25	79.05	81.85	80.55	79.9	81.4	86.3	89.3	84.6	81.4	80.3
15	79.65	79.25	79.05	81.8	80.55	79.9	81.5	86.4	89.8	84.4	81.3	80.2
16	79.6	79.25	79.0	81.8	80.5	79.9	81.6	86.5	90.2	84.2	81.3	80.2
17	79.6	79.25	79.05	81.8	80.5	79.9	81.8	86.6	90.3	84.0	81.2	80.2
18	79.55	79.2	79.1	81.8	80.45	79.9	82.0	86.7	90.3	83.85	81.2	80.1
19	79.55	79.2	79.15	81.8	80.4	79.9	82.2	86.7	90.3	83.7	81.2	80.1
20	79.5	79.2	79.2	81.7	80.35	79.9	82.4	86.75	90.3	83.55	81.1	80.1
21	79.5	79.2	79.3	81.6	80.3	79.9	82.5	86.7	90.2	83.4	81.1	80.0
22	79.5	79.2	79.4	81.5	80.25	79.9	82.6	86.6	90.1	83.3	81.1	80.0
23	79.5	79.2	79.45	81.4	80.2	79.95	82.7	86.5	90.0	83.2	81.0	80.0
24	79.45	79.2	79.5	81.3	80.15	79.95	82.8	86.4	89.8	83.1	81.0	80.0
25	79.45	79.15	79.55	81.4	80.15	80.0	82.9	86.2	89.5	83.0	81.0	79.9
26	79.4	79.15	79.6	81.3	80.1	80.0	83.0	86.0	89.3	82.85	80.9	79.9
27	79.4	79.15	79.65	81.25	80.1	80.05	83.1	85.8	89.0	82.7	80.9	79.9
28	79.4	79.15	79.7	81.2	80.05	80.05	83.2	85.6	88.8	82.6	80.8	79.9
29	79.4	79.15	79.75	81.15	.....	80.1	83.3	85.4	88.5	82.5	80.8	79.9
30	79.35	79.15	79.8	81.1	.....	80.1	83.4	85.2	88.2	82.4	80.8	79.8
31	79.35	.....	79.9	81.05	.....	80.15	.....	85.3	.....	82.3	80.7	.....

FLATHEAD RIVER NEAR POLSON, MONT.

LOCATION.—In sec. 19, T. 22 N., R. 21 W., at Mischell's ferry at Norrisvale, 5 miles below Newell tunnel, 15 miles northwest of Ronan, and 12 miles below Polson, Flathead County.

DRAINAGE AREA.—7,010 square miles.

RECORDS AVAILABLE.—July 23, 1907, to September 30, 1918.

GAGE.—Vertical staff in four sections on left bank installed April 9, 1916; read by M. Slyapich. Prior to April 9, 1916, chain gage on right bank at same datum.

DISCHARGE MEASUREMENTS.—Made from car on ferry cable 80 feet below gage. Ferry cable removed in 1918 and measurements made at highway bridge at Polson 12 miles upstream.

CHANNEL AND CONTROL.—Control at riffle 1,000 feet below gage; permanent. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.0 feet June 19–21 (discharge, 58,400 second-feet); minimum stage, 1.4 feet December 19–20 (discharge, 2,310 second-feet).

1907–1918: Maximum stage recorded, 16.4 feet June 12, 1913 (discharge, 75,400 second-feet); minimum stage recorded, 1.00 foot March 12, 1917 (discharge, 2,000 second-feet).

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ICE.—Stage-discharge relation not seriously affected by ice, and open channel rating applied.

DIVERSIONS.—Several small diversions from tributaries above Flathead Lake.

REGULATION.—Flathead Lake affords natural regulation.

ACCURACY.—Stage-discharge relation practically permanent. Daily discharge determined from rating curve which is well defined. Gage read to tenths once daily. Daily discharge determined by applying daily gage height to rating table. Records good.

No discharge measurements made during year.

Daily discharge, in second-feet, of Flathead River near Polson, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,600	2,690	2,490	3,350	5,840	3,010	5,630	17,500	27,000	41,600	12,000	5,840
2	3,470	2,690	2,490	4,020	5,430	3,010	6,060	18,500	27,500	39,700	11,600	5,630
3	3,470	2,690	2,490	5,230	5,040	3,010	5,630	20,000	27,500	37,800	11,300	5,590
4	3,470	2,690	2,490	7,820	5,040	3,010	5,630	21,500	27,500	37,800	10,900	5,550
5	3,470	2,690	2,490	9,000	4,850	2,900	5,840	24,200	27,500	32,200	10,900	5,510
6	3,470	2,690	2,490	9,930	4,850	2,900	6,290	27,500	27,500	31,000	9,620	5,470
7	3,470	2,690	2,490	10,200	4,850	2,900	6,520	29,800	28,100	30,400	8,700	5,430
8	3,470	2,690	2,490	10,600	4,500	2,900	6,520	32,800	29,300	29,800	9,310	5,430
9	3,350	2,690	2,490	11,300	4,330	2,900	6,760	32,800	32,200	28,100	9,310	5,220
10	3,350	2,690	2,490	10,200	4,330	3,880	7,010	32,800	34,600	27,500	9,310	5,230
11	3,230	2,690	2,590	10,200	4,170	4,020	7,270	32,800	38,400	26,400	9,000	5,140
12	3,120	2,690	2,690	10,200	4,170	4,020	7,820	32,200	42,300	24,700	9,000	5,040
13	3,010	2,690	2,590	10,200	4,170	4,020	8,700	32,800	46,200	24,200	9,000	4,940
14	3,230	2,590	2,590	10,200	4,020	4,020	9,620	32,800	50,200	23,100	9,000	4,850
15	3,010	2,590	2,490	10,200	3,880	4,020	9,930	33,400	54,300	22,000	8,700	4,710
16	3,350	2,590	2,490	10,200	3,880	4,020	10,600	33,400	57,000	21,000	8,700	4,580
17	2,900	2,590	2,490	10,200	3,880	4,020	11,300	33,400	57,000	20,500	8,400	4,440
18	2,900	2,590	2,400	9,930	3,880	3,880	11,600	34,000	57,700	19,500	7,820	4,310
19	2,900	2,590	2,310	9,620	3,880	3,880	11,600	34,600	58,400	19,000	7,540	4,170
20	2,790	2,590	2,310	9,620	3,740	3,880	12,000	34,000	58,400	18,000	7,540	4,100
21	2,790	2,590	2,400	9,310	3,740	3,880	13,200	34,000	58,400	17,100	7,540	4,020
22	2,790	2,590	2,590	9,000	3,600	3,880	12,800	33,400	57,000	16,600	7,270	4,000
23	2,790	2,490	2,790	9,000	3,600	3,880	13,200	32,800	56,300	16,200	7,010	3,980
24	2,790	2,490	2,900	8,700	3,350	4,020	13,600	32,200	54,300	16,200	7,010	3,970
25	2,790	2,490	2,790	8,700	3,230	4,170	14,800	31,000	52,200	14,800	6,760	3,960
26	2,790	2,490	2,790	8,700	3,230	4,170	15,300	29,800	50,200	14,400	6,520	3,940
27	2,790	2,490	2,790	8,400	3,230	4,330	15,300	28,700	50,200	13,600	6,520	3,920
28	2,690	2,490	2,790	8,110	3,010	4,500	16,200	27,500	47,500	13,200	6,520	3,910
29	2,690	2,490	2,790	6,520	.....	4,670	16,600	27,000	46,200	12,800	6,290	3,900
30	2,690	2,490	2,790	5,840	.....	4,670	16,600	26,400	44,900	12,400	6,290	3,880
31	2,690	.....	2,790	5,840	.....	4,500	.....	26,400	.....	12,400	6,060	.....

NOTE.—Gage not read; discharge interpolated: Sept. 3-6, 11-13, 15-18, 20, 22-29.

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Monthly discharge of Flathead River near Polson, Mont., for the year ending Sept. 30, 1918.

[Drainage area, 7,010 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	3,600	2,690	3,070	0.438	0.50	189,000
November	2,690	2,490	2,610	.372	.42	155,000
December	2,900	2,310	2,580	.368	.42	159,000
January	11,300	3,350	8,720	1.24	1.43	536,000
February	5,840	3,010	4,130	.589	.61	229,000
March	4,670	2,900	3,770	.538	.62	232,000
April	16,600	5,630	10,300	1.47	1.64	613,000
May	34,600	17,500	29,700	4.24	4.89	1,830,000
June	58,400	27,000	44,200	6.31	7.04	2,630,000
July	41,600	12,400	23,000	3.28	3.78	1,410,000
August	12,000	6,060	8,430	1.20	1.38	518,000
September	5,840	3,880	4,690	.669	.75	279,000
The year	58,400	2,310	12,100	1.73	23.48	8,780,000

MIDDLE FORK OF FLATHEAD RIVER AT BELTON, MONT.

LOCATION.—In NW. ¼ sec. 36, T. 32 N., R. 19 W., at Hotel Belton, half a mile below highway bridge at Belton and 2 miles above Lake McDonald outlet, Flathead County.

DRAINAGE AREA.—900 square miles.

RECORDS AVAILABLE.—October 5, 1910, to September 30, 1918.

GAGE.—Inclined gage on left bank back of Hotel Belton; read by Mrs. S. C. Brock.

DISCHARGE MEASUREMENTS.—Made from cable 200 feet below gage.

CHANNEL AND CONTROL.—Bed composed of rock ledge and gravel; slightly shifting. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.85 feet June 11 (discharge, 22,300 second-feet); minimum stage recorded, 1.70 feet November 1-5 (discharge, 295 second-feet).

1910-1918: Maximum stage recorded, 20.0 feet at 9 a. m. June 21, 1916 (discharge determined by extension of rating curve, 49,000 second-feet); minimum stage recorded, 1.3 feet March 29-30, 1912 (discharge, 182 second-feet).

ICE.—Stage-discharge relation seriously affected by ice; discharge not computed because of insufficient data.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation slightly shifting. Rating tables fairly well defined between 325 and 20,000 second-feet. Gage read to half-tenths daily. Daily discharge determined by applying daily gage height to rating table. Records good.

No discharge measurements made during year.

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Daily discharge, in second-feet, of Middle Fork of Flathead River at Belton, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	510	295	325	680	485	1,580	5,000	7,910	4,120	1,310	820
2	485	295	325	710	485	1,770	7,250	6,400	3,820	1,390	820
3	485	295	325	770	510	1,580	9,780	5,780	3,260	1,390	820
4	462	295	310	770	535	1,440	15,000	5,980	2,870	1,390	820
5	462	295	310	800	510	1,320	15,600	6,610	2,620	1,390	790
6	440	310	310	830	462	1,400	13,100	8,600	2,510	1,310	790
7	440	310	310	770	462	1,360	11,000	11,800	2,510	1,310	820
8	440	310	310	680	462	1,580	8,600	13,600	2,510	1,230	790
9	420	310	310	680	440	2,080	7,250	18,000	2,560	1,230	730
10	420	310	310	650	420	2,900	7,030	19,600	2,740	1,270	700
11	400	310	310	650	420	3,770	6,820	22,300	2,740	1,310	700
12	400	310	310	650	420	4,450	6,610	18,600	2,340	1,310	670
13	380	310	310	620	420	5,380	6,610	17,600	2,190	1,350	670
14	380	310	310	485	420	5,100	6,820	16,500	2,190	1,310	640
15	380	310	310	485	420	4,270	8,140	15,900	2,140	1,270	640
16	360	310	310	440	420	3,690	9,060	13,600	2,140	1,270	610
17	360	310	.....	400	462	3,170	8,140	12,600	2,090	1,230	610
18	342	310	.....	360	562	2,770	7,250	11,500	2,000	1,230	610
19	342	310	.....	325	650	2,900	7,250	10,300	2,000	1,160	640
20	325	310	.....	325	740	3,030	6,820	9,660	1,910	1,160	640
21	325	310	.....	380	740	2,900	5,980	9,060	1,910	1,040	640
22	325	310	.....	400	800	3,310	5,190	8,370	1,910	1,010	640
23	325	310	.....	510	800	3,610	4,623	7,360	1,730	1,010	640
24	325	325	.....	535	830	3,930	4,270	6,820	1,600	1,040	640
25	325	325	.....	485	1,100	4,100	3,930	5,980	1,550	1,040	580
26	310	325	.....	440	1,240	4,810	3,610	5,380	1,390	1,040	580
27	310	325	.....	485	1,480	5,190	3,460	4,720	1,390	975	552
28	310	325	.....	485	1,620	5,000	4,450	4,200	1,350	940	552
29	310	325	.....	.....	1,480	4,900	5,580	3,820	1,350	940	552
30	310	325	.....	.....	1,440	5,000	6,400	3,540	1,310	880	552
31	310	.....	.....	.....	1,400	.....	9,540	.....	1,310	880	.....

NOTE.—Stage-discharge relation affected by ice Dec. 17 to Jan. 31; discharge not estimated.

Monthly discharge of Middle Fork of Flathead River at Belton, Mont., for the year ending Sept. 30, 1918.

[Drainage area, 900 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	510	310	378	0.420	0.48	23,200
November	325	295	311	.346	.39	18,500
December 1-16	325	310	313	.348	.21	9,930
February	830	325	564	.627	.65	31,300
March	1,620	420	730	.811	.94	44,900
April	5,380	1,320	3,280	3.64	4.06	195,000
May	15,600	3,460	7,420	8.24	9.50	456,000
June	22,300	3,540	10,400	11.6	12.9	619,000
July	4,120	1,310	2,200	2.44	2.81	135,000
August	1,390	880	1,180	1.31	1.51	72,600
September	820	552	675	.750	.84	40,200

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BIG CREEK NEAR POLSON, MONT.

LOCATION.—Near township line between sec. 4, T. 22 N., R. 19 W., and sec. 33, T. 23 N., R. 19 W., just below power house of Mission Range Power Co., three-quarters of a mile above mouth, and 7 miles east of Polson, Flathead County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 1, 1917, to September 30, 1918.

GAGE.—Stevens eight-day water-stage recorder on left bank, used since June 14, 1917; inspected by Earl Webster. Prior to that date temporary gage on left bank 200 feet downstream.

CHANNEL AND CONTROL.—Artificial control at gage; repaired August 18, 1917, but not completed until October 29, 1917; shifting. Banks high and are not overflowed.

DISCHARGE MEASUREMENTS.—Made from foot log just below gage or by wading near by.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 1.9 feet June 11–14 (discharge, 38 second-feet); minimum stage, 1.26 feet January 30 (discharge, 1.8 second-feet).

1917–1918: Maximum stage recorded 2.4 feet at 6 p. m. June 9, 1917 (discharge from extension of curve, 104 second-feet); minimum stage same as above.

ICE.—Stage-discharge relation affected by ice for short period.

DIVERSIONS.—None.

REGULATION.—Operation of power plant materially affects flow, maximum being during low water.

ACCURACY.—Stage-discharge relation not permanent. Rating curve well defined between 5 and 40 second-feet; applied indirectly October 1–22 and March 15–31. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table daily gage height determined by inspection of recorder graph. Records good.

Discharge measurements of Big Creek near Polson, Mont., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 20	R. O. Crawford [a]	1.42	5.2	July 29	W. A. Lamb	1.37	5.8
June 13	do	1.90	38.1	Aug. 2	R. O. Crawford [a]	1.36	5.4
July 13	do	1.50	12.6				

[a] Engineer, U. S. Reclamation Service.

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Daily discharge, in second-feet, of Big Creek near Polson, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9.1	4.5	7.6	27.0	.....	6.2	10.5	25.0	11.0	10.0	5.8	4.5
2	9.6	4.5	5.4	26.0	.....	6.2	8.6	26.0	9.1	9.6	5.8	5.8
3	10.0	4.5	6.7	20.6	.....	5.0	8.1	26.0	5.8	11.0	5.8	5.4
4	9.6	3.7	6.2	13.8	.....	5.0	8.1	30.0	8.1	18.0	5.8	5.0
5	9.6	4.5	6.2	11.0	.....	5.0	8.6	.....	11.5	12.0	6.2	5.4
6	10.0	4.5	5.8	9.1	.....	5.0	9.1	.....	15.6	12.0	5.8	5.4
7	7.1	4.5	5.0	10.0	6.2	5.0	8.6	.....	18.6	9.1	5.8	5.4
8	10.0	4.1	5.0	7.6	5.8	4.5	10.5	.....	24.5	9.1	6.2	4.5
9	11.0	3.7	4.5	5.4	5.8	5.0	18.0	.....	21.9	9.6	5.8	5.4
10	10.0	3.2	6.7	5.4	5.0	5.0	21.2	.....	31.0	9.1	6.2	5.4
11	11.5	3.2	6.2	5.4	6.2	4.5	16.8	.....	38.0	9.6	6.2	5.8
12	11.5	5.0	5.8	5.4	5.8	4.5	9.1	.....	38.0	9.6	7.1	6.2
13	11.5	4.5	5.8	5.4	5.4	4.5	10.5	.....	38.0	9.1	7.1	5.4
14	8.1	4.1	5.8	5.4	5.4	4.5	23.2	.....	38.0	7.1	7.1	5.8
15	9.1	4.1	6.7	5.4	5.0	5.0	18.0	.....	31.6	8.1	8.1	5.4
16	11.5	4.1	4.5	5.4	5.8	5.0	15.0	.....	24.5	8.1	8.1	5.4
17	7.6	2.5	5.8	4.5	5.4	4.1	13.2	.....	24.5	7.1	7.1	6.2
18	8.6	2.8	12.6	4.5	5.0	5.4	12.0	.....	24.5	6.7	6.2	5.9
19	4.5	4.5	17.4	4.5	5.0	4.5	11.0	.....	24.5	6.2	5.8	5.6
20	3.2	4.5	9.1	4.5	5.0	3.7	12.0	11.0	24.5	6.7	6.7	5.4
21	5.4	4.1	6.2	3.7	5.1	3.7	16.8	11.0	18.0	5.4	5.8	5.2
22	8.1	4.5	5.8	3.7	5.2	5.4	18.6	10.5	18.0	6.2	5.8	5.0
23	7.9	4.1	5.0	3.7	5.3	7.6	18.0	8.1	12.0	6.2	5.8	7.1
24	7.7	5.0	5.2	3.7	5.4	8.1	18.6	7.1	12.0	6.2	5.4	7.1
25	7.5	3.7	5.5	3.7	5.8	10.5	20.6	6.2	9.6	6.7	5.4	7.1
26	7.4	5.8	5.8	4.1	6.2	12.0	17.4	6.2	10.0	6.2	5.4	6.7
27	7.3	6.2	7.6	2.2	6.2	10.5	15.6	6.2	11.0	6.7	5.4	5.4
28	7.2	5.8	10.5	2.0	6.2	9.6	16.2	5.8	11.0	6.2	5.0	6.2
29	7.1	5.8	15.0	2.0	.....	9.1	18.0	6.7	10.0	5.8	5.4	5.4
30	7.6	6.7	21.0	1.8	.....	11.5	21.2	10.0	10.0	5.8	5.0	5.4
31	5.4	.....	28.0	.....	.....	11.0	.....	13.2	.....	5.8	5.4	.....

NOTE.—Recorder not in operation; discharge interpolated Oct. 23–28, Dec. 24–25, 30, Jan. 10–13, Feb. 20–23, March 4–5, Aug. 3, and Sept. 18–21. Staff gage read twice daily June 10 to July 8 and Aug. 11–17.

Monthly discharge of Big Creek near Polson, Mont., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	11.5	3.2	8.44	519
November	6.7	2.5	4.42	263
December	28	4.5	8.21	505
January 1–30	27	1.8	7.23	430
February 7–28	6.2	5.0	5.55	242
March	12.0	3.7	6.34	390
April	23.2	8.1	14.4	857
May (16 days)	30	5.8	13.1	416
June	38	5.8	19.5	1,160
July	18.0	5.4	8.23	506
August	8.1	5.0	6.08	374
September	7.1	4.5	5.66	337

JOCKO RIVER NEAR JOCKO, MONT.

LOCATION.—In sec. 10, T. 16 N., R. 19 W., 500 feet above headworks of United States Reclamation Service Jocko K canal, 800 feet above mouth of Big Knife Creek, and 2 miles northeast of Jocko, Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 11 to September 30, 1918. At old station 2 miles downstream August 20, 1908, to September 30, 1916. Flow at two points not directly comparable as Big Knife Creek enters, and canal diverts between them.

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GAGE.—Vertical staff on right bank; read occasionally by employees of United States Reclamation Service.

DISCHARGE MEASUREMENTS.—Made from suspension bridge 50 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel, slightly shifting. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year 7.5 feet June 11, (discharge, 2,720 second-feet); minimum discharge during period, 101 second-feet September 29 and 30.

ICE.—Station not in operation during the ice period.

DIVERSIONS.—None above station. Jocko K canal diverts 500 feet below gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent; not affected by ice. Rating curve fairly well defined. Gage heights read occasionally to hundredths or tenths. Daily discharge ascertained by applying gage height to rating table for days of gage readings and interpolating discharge for intervals between readings. Records fair.

COOPERATION.—Complete data furnished by United States Reclamation Service. Monthly computations slightly changed to conform to standard rules of computation of United States Geological Survey.

Discharge measurements of Jocko River near Jocko, Mont., during the year ending Sept. 30, 1918.

[Made by R. O. Crawford.[a]]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Apr. 11	4.61	326
June 21	5.46	857
July 10	4.30	310

[a] Engineer, U. S. Reclamation Service.

Daily discharge, in second-feet, of Jocko River near Jocko, Mont., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	907	995	374	185	128	16	425	984	1,580	239	170	108
2	.....	929	1,130	374	192	126	17	436	911	1,360	270	166	107
3	.....	952	1,260	358	181	124	18	447	838	1,130	270	162	106
4	.....	975	1,400	328	181	122	19	458	765	1,040	256	159	104
5	.....	998	1,590	328	174	122	20	469	692	948	245	165	103
6	.....	1,020	1,780	310	209	120	21	481	618	856	245	171	104
7	.....	1,040	1,960	292	185	118	22	493	595	812	234	178	105
8	.....	1,060	2,150	276	172	117	23	505	572	768	224	185	106
9	.....	1,070	2,340	276	172	115	24	559	549	724	224	173	107
10	.....	1,080	2,530	261	172	114	25	613	526	680	219	162	106
11	370	1,090	2,720	270	174	112	26	667	503	629	219	151	104
12	381	1,100	2,490	261	176	111	27	721	479	578	256	140	102
13	392	1,120	2,260	261	178	110	28	775	455	527	234	136	102
14	403	1,130	2,040	245	175	109	29	830	590	476	209	133	101
15	414	1,060	1,810	245	173	109	30	885	725	425	199	132	101
							31	.....	860	.....	192	130	.....

NOTE.—Gage read on following days: Apr. 11, 23, 30; May 7, 14, 21, 28; June 4, 11, 18, 21, 25; July 1-31; August 1-10, 13, 16, 19, 23, 27, 29, 31; Sept. 3, 6, 9, 13, 17, 20, 24, 27. Discharge interpolated for intervening days.

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Monthly discharge of Jocko River near Jocko, Mont., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 11-30	885	370	536	21,300
May	1,130	455	845	52,000
June	2,720	425	1,370	81,500
July	374	192	264	16,200
August	209	130	168	10,300
September	128	101	111	6,600
The period				188,000

REVAIS CREEK NEAR DIXON, MONT.

LOCATION.—In T. 18 N., R. 22 W., below highway bridge near residence of A. Bishop, 4 miles southwest of Dixon, Sanders County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 30, 1911, to September 30, 1916, and October 1, 1917, to 1918.

GAGE.—Staff gage attached to tree on right bank about 100 feet below highway bridge; read by A. Bishop.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Bed composed of small boulders. Control shifts. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.40 feet June 10–11 (discharge, 204 second-feet); minimum discharge, 3.0 second-feet January 23 to March 19 and September 13, 1918.

1911–1918: Maximum stage recorded, 3.7 feet June 19, 1916 (discharge, 512 second-feet); minimum stage recorded, same as in 1918.

ICE.—Stage-discharge relation affected by ice January 30 to February 2 and February 18–22. Discharge estimated at 3.0 second-feet for these periods.

DIVERSIONS.—None of importance.

REGULATION.—None. The melting snow causes small diurnal fluctuation during spring.

ACCURACY.—Stage-discharge relation shifted. Two rating curves used are fairly well defined; one used October 1 to December 31, and the other January 1 to September 30. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean gage height to rating table. Records fair.

COOPERATION.—Records furnished by United States Reclamation Service.

Discharge measurements of Revais Creek near Dixon, Mont., during the year ending Sept. 30, 1918.

[Made by R. O. Crawford.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 7	3.05	157
Aug. 12	1.60	9.19
Sept. 20	1.50	5.35

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Daily discharge, in second-feet, of Revais Creek near Dixon, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9	8	8	138	3	3	73	132	106	38	10	5
2	9	8	8	138	3	3	78	158	112	38	10	5
3	9	8	8	125	3	3	68	170	112	38	10	5
4	9	8	8	112	3	3	57	184	125	38	10	5
5	9	8	8	100	3	3	47	191	125	29	10	5
6	9	8	8	89	3	3	29	191	144	29	16	5
7	9	8	8	78	3	3	22	177	170	29	16	5
8	9	8	8	68	3	3	22	177	191	29	16	5
9	8	8	8	68	3	3	29	158	191	29	10	5
10	8	8	8	84	3	3	42	118	204	22	10	5
11	8	8	8	106	3	3	62	94	204	22	10	5
12	8	8	8	84	3	3	84	89	191	22	10	5
13	8	8	13	62	3	3	89	100	191	22	10	3
14	8	8	13	52	3	3	89	112	177	22	10	5
15	8	8	10	34	3	3	78	125	164	22	10	5
16	8	8	9	26	3	3	78	138	164	22	10	5
17	8	8	10	19	3	3	68	138	151	16	10	5
18	8	8	16	10	3	3	68	125	144	16	10	5
19	8	8	22	8	3	3	57	112	138	16	10	5
20	8	8	23	5	3	4	57	112	138	16	10	5
21	8	8	23	5	3	4	62	100	125	16	10	5
22	8	8	23	4	3	4	73	100	112	16	10	5
23	8	8	20	3	3	4	84	89	100	16	10	5
24	8	8	16	3	3	5	94	89	100	16	10	5
25	8	8	12	3	3	13	100	89	89	16	10	5
26	8	8	10	3	3	19	100	89	78	16	10	5
27	8	8	10	3	3	26	89	89	68	16	10	5
28	8	8	16	3	3	29	89	78	57	16	5	5
29	8	8	33	3	.....	29	94	78	47	16	5	5
30	8	8	64	3	.....	29	106	84	38	16	5	5
31	8	.....	142	3	.....	42	.....	94	.....	16	5	.....

Monthly discharge of Revais Creek near Dixon, Mont., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9	8	8.26	508
November	8	8	8.00	476
December	142	8	18.7	1,150
January	138	3	46.5	2,860
February	3	3	3.00	167
March	42	3	8.55	526
April	106	22	69.6	4,140
May	191	78	122	7,500
June	204	38	132	7,860
July	38	16	22.3	1,370
August	16	5	9.94	611
September	5	3	4.93	293
The year	204	3	37.9	27,500

SULLIVAN LAKE NEAR METALINE FALLS, WASH.

LOCATION.—Approximately in sec. 31, T. 39 N., R. 44 E., (unsurveyed) near forest-ranger station at north end of Sullivan Lake, 4¼ miles east of Metaline Falls, Pend Oreille County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 16, 1912, to September 30, 1918.

GAGE.—Float gage on dam at outlet of lake, installed May 9, 1913, at same datum and site as staff gage used previously; read by A. J. McDougall.

EXTREMES OF STAGE.—Maximum stage recorded during year, 22.40 feet June 24–29; minimum stage recorded, 6.00 feet April 9.

1912–1918: Maximum stage recorded, 26.6 feet June 17–20, 1916; uninimum stage recorded, April 9, 1918.

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REGULATION.—Most of surplus flow of Sullivan Creek is diverted into lake. Sufficient water is stored in lake to afford a continuous flow of about 60 second-feet in flume of Inland Portland Cement Co. Zero of gage at elevation of gate sills; crest of log chute is 22 feet, and crest of spillway 25 feet, above gate sills.

COOPERATION.—Gage-height record furnished by Inland Portland Cement Co.

Daily gage height, in feet, of Sullivan Lake, near Metaline Falls, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	18.90	15.90	13.50	11.60	9.70	8.10	6.20	8.30	17.80	22.30	20.50	18.50
2	18.85	15.85	13.50	11.55	9.65	8.00	6.15	8.60	18.00	22.30	19.90	18.50
3	18.80	15.80	13.50	11.40	9.65	7.90	6.20	8.75	18.20	22.20	19.80	.....
4	18.60	15.70	13.40	11.55	9.60	7.90	6.20	8.90	18.60	22.15	19.80	.....
5	18.50	15.65	13.35	11.65	9.60	7.80	6.20	9.65	18.70	22.10	19.75	.....
6	18.40	15.60	13.35	11.60	9.50	7.75	6.20	11.05	18.90	22.05	19.80	17.30
7	18.30	15.50	.....	11.60	9.45	7.70	6.20	11.30	19.05	22.00	19.85	17.30
8	18.20	15.40	13.20	11.60	9.40	7.65	6.20	12.01	19.20	22.10	19.95	17.25
9	18.00	15.20	13.15	11.50	9.30	7.60	6.00	12.35	20.00	22.05	19.90	17.20
10	17.85	15.00	.....	11.50	9.30	7.50	6.05	12.50	20.40	22.10	19.90	17.15
11	17.75	14.90	12.90	11.50	9.20	7.40	6.10	12.70	20.90	22.00	19.85	17.10
12	17.65	14.80	12.85	11.40	9.15	7.35	6.20	12.90	21.40	21.90	19.85	17.05
13	17.60	14.80	12.80	11.40	9.00	7.30	6.20	13.40	21.60	21.90	19.75	17.00
14	17.55	14.70	12.70	11.30	9.00	7.25	6.30	13.70	21.80	21.85	19.70	16.95
15	17.50	14.70	12.60	11.20	9.00	7.20	6.30	14.00	22.00	21.80	19.70	16.90
16	17.40	14.60	12.60	11.10	8.90	7.20	6.30	14.40	22.00	21.75	19.65	16.85
17	17.30	14.60	12.60	11.00	8.80	7.15	6.30	14.70	22.00	21.65	19.60	16.75
18	17.20	14.50	12.55	10.95	8.70	7.10	6.35	15.10	22.10	21.50	19.60	16.70
19	17.10	14.40	12.55	10.90	8.70	7.10	6.30	15.50	22.10	21.40	19.40	16.65
20	17.00	14.35	12.45	10.70	8.65	7.00	6.30	15.65	22.00	21.40	19.30	16.60
21	16.95	14.35	12.40	10.60	8.55	7.00	6.40	15.70	22.00	.....	19.25	16.55
22	16.90	14.30	12.30	10.50	8.50	7.00	6.35	15.95	22.00	21.10	19.30	16.50
23	16.85	14.20	12.20	10.40	8.40	6.80	6.40	16.30	22.20	21.05	19.25	16.50
24	16.75	14.10	12.10	10.30	.....	6.50	6.80	16.40	22.40	21.00	19.10	16.50
25	16.60	14.05	.....	10.25	.....	6.30	7.35	16.55	22.40	20.95	19.05	16.50
26	16.50	14.00	12.00	10.20	.....	6.30	7.50	16.60	22.40	20.95	19.00	16.50
27	16.40	13.90	12.00	10.20	.....	6.30	7.60	16.75	22.40	20.90	19.00	16.50
28	16.30	13.80	11.90	10.10	.....	6.20	7.80	17.00	22.30	20.85	18.90	16.50
29	16.10	13.70	11.80	10.00	.....	6.20	7.90	17.20	22.40	20.70	18.80	16.50
30	16.00	13.60	11.60	9.90	.....	6.20	8.10	17.40	.....	20.60	18.70	16.50
31	15.95	.....	11.55	9.80	.....	6.20	.....	17.60	.....	20.55	18.60	.....

NOTE.—Gage not read on days for which no gage height is given.

SULLIVAN CREEK NEAR METALINE FALLS, WASH.

LOCATION.—In sec. 30, T. 39 N., R. 44 E., one-eighth mile below Outlet Creek, half a mile below Sullivan Lake, and 4 miles east of Metaline Falls, Pend Oreille County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 16, 1912, to September 30, 1918.

GAGE.—Vertical staff in four sections on left bank, installed September 21, 1917; read by A. J. McDougall. Prior to September 21, 1917, vertical staff on right bank directly opposite present gage and at same datum.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 40 feet below gage.

CHANNEL AND CONTROL.—Bed composed of cobblestones and coarse gravel; shifting. Gradient steep. No well-defined control. Banks high and not subject to overflow. Stage of zero flow, according to measurements made October 20, 1918, gage height +0.2 foot ±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.7 feet June 9 (discharge, 646 second-feet); minimum recorded stage, 1.30 feet September 25–30 (discharge, 74 second-feet).

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1912–1918: Maximum stage recorded, 4.2 feet June 2, 1913 (discharge, 1,650 second-feet); minimum stage recorded, 1.10 feet February 1, 1913 (discharge, 53 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Water is diverted from Sullivan Creek about a mile above station for storage in Sullivan Lake, but entire run-off of drainage basin passes gage.

REGULATION.—Storage in Sullivan Lake is used by Inland Portland Cement Co. to increase low-water flow.

ACCURACY.—Stage-discharge relation changed three times during year. Three fairly well defined rating curves used as follows: October 1 to April 8, May 2 to June 8, June 9 to July 26. Indirect method for shifting control used remainder of year. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records poor during period October to April; fair during remainder of year.

COOPERATION.—Station maintained in cooperation with United States Forest Service and Inland Portland Cement Co.

Discharge measurements of Sullivan Creek near Metaline Falls, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 3	R. B. Kilgore	2.32	394
June 30	L. D. Carson	1.67	185
30	do	1.67	191

Daily discharge, in second-feet, of Sullivan Creek near Metaline Falls, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	97	106	126	123	99	99	123	173	316	166	99	90
2	97	108	123	123	95	99	118	232	273	169	103	88
3	97	108	123	120	95	103	126	384	252	169	106	86
4	95	110	118	139	108	109	128	524	273	166	103	85
5	95	108	118	128	113	83	128	453	294	169	103	84
6	92	108	120	128	108	86	128	407	316	166	103	83
7	97	108	119	123	103	88	128	384	407	166	103	83
8	101	103	118	120	101	88	133	316	566	166	103	81
9	101	101	113	118	103	97	166	294	646	166	128	81
10	101	99	106	113	106	99	186	316	622	166	115	81
11	106	99	99	108	106	101	204	361	598	166	115	81
12	110	99	101	106	106	97	211	430	598	166	103	79
13	115	123	99	106	101	97	200	476	598	173	97	79
14	115	110	99	108	97	92	197	384	574	180	97	79
15	110	103	103	103	95	92	193	453	574	176	95	79
16	113	101	123	106	95	95	190	453	479	173	92	79
17	110	99	128	103	95	95	166	407	416	157	92	77
18	110	97	126	103	95	99	169	361	387	142	92	77
19	110	97	126	103	95	97	180	316	342	136	92	77
20	108	97	123	95	95	106	183	316	342	136	92	77
21	110	101	120	88	95	108	180	252	320	130	103	77
22	106	99	123	99	90	108	180	240	299	123	128	77
23	108	99	118	110	95	113	183	240	299	123	110	75
24	108	99	115	110	95	115	163	232	299	123	97	75
25	108	97	112	115	96	120	160	232	258	123	97	74
26	110	97	108	108	97	136	154	212	219	166	92	74
27	113	97	99	108	98	126	151	212	219	166	92	74
28	106	101	110	110	99	120	180	212	183	145	92	74
29	103	106	110	108	.....	128	173	273	166	110	92	74
30	103	126	120	106	.....	128	173	273	193	103	92	74
31	106	.....	126	97	.....	120	.....	316	.....	99	90	.....

NOTE.—Gage not read Dec. 7, 10, 25, Feb. 24–28, July 21, Sept. 3–5; discharge interpolated

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Monthly discharge of Sullivan Creek near Metaline Falls, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	115	92	105	6,460
November	126	97	104	6,190
December	128	99	115	7,070
January	133	88	111	6,830
February	113	90	99.1	5,500
March	126	83	105	6,460
April	211	118	165	9,820
May	524	173	327	20,100
June	646	166	375	22,300
July	180	99	151	9,280
August	128	90	101	6,210
September	90	74	79.1	4,710
The year	646	74	153	111,000

KETTLE RIVER BASIN.

CURLEW CREEK NEAR CURLEW, WASH.

LOCATION.—In sec. 21, T. 38 N., R. 33 E., 400 feet below mouth of Lambert Creek, half a mile below outlet of Curlew Lake, 9 miles above Curlew, and 12 miles northeast of Republic, Ferry County.

DRAINAGE AREA.—About 93 square miles (measured on topographic and Forest Service maps); uncertain because divide between Curlew Creek and San Poil River can not be accurately determined.

RECORDS AVAILABLE.—May 4, 1917, to September 30, 1918.

GAGE.—Vertical staff on right bank attached to upstream wing wall of railroad culvert; read by Henry Kuehne.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Permanent and sensitive control formed by wooden culvert under railroad having a free fall of 1 foot. Banks subject to overflow below gage, but not above. Stage of zero flow, determined October 8, 1918 as −0.12 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.98 foot April 20 and May 23 (discharge, 11.2 second-feet); minimum stage recorded, 0.10 foot September 11 (discharge, 0.7 second-foot).

1917–1918: Maximum stage recorded, 3.08 feet May 30, June 2 and 6, 1917 (discharge, 65 second-feet); minimum stage same as 1918.

ICE.—Stage-discharge relation not affected by ice during year.

DIVERSIONS.—None.

REGULATION.—Natural storage in Curlew Lake.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Curlew Creek near Curlew, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 15	T. R. Newell	0.57	4.6
Apr. 21	R. B. Kilgore	.96	11.1
21	do	.96	11.5

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Daily discharge, in second-feet, of Curlew Creek near Curlew, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.3	1.6	1.8	5.7	4.9	4.1	8.3	9.1	10.9	3.4	1.7	1.1
2	1.2	1.8	1.8	5.7	5.0	4.3	7.8	9.5	8.8	3.2	2.0	1.0
3	1.3	2.0	1.9	5.8	5.1	4.4	7.5	9.8	8.6	3.0	2.2	1.0
4	1.3	2.0	1.9	5.7	5.3	4.6	8.1	10.0	8.4	2.9	2.0	1.0
5	1.3	2.0	2.0	5.4	5.7	4.7	8.6	9.1	8.3	2.8	1.9	.9
6	1.4	1.8	2.0	5.4	5.5	4.9	8.8	8.4	8.1	2.7	1.7	1.0
7	1.4	1.6	2.2	5.2	5.4	5.1	9.1	9.0	8.1	2.7	1.7	.9
8	1.5	1.6	2.2	5.4	5.1	4.9	9.8	9.5	8.4	2.6	1.6	.8
9	1.4	1.6	2.4	5.1	5.1	4.6	9.6	10.0	8.1	2.8	2.3	.8
10	1.3	1.6	2.5	5.1	5.0	4.4	9.5	8.4	7.3	3.0	2.0	.8
11	1.3	1.6	2.8	5.4	5.1	4.5	9.8	8.8	6.8	2.8	2.0	.7
12	1.3	1.7	3.2	5.7	4.9	4.6	10.2	9.1	6.2	2.7	1.9	.8
13	1.3	1.8	3.5	5.7	4.9	4.9	10.5	9.0	5.9	2.5	1.9	.9
14	1.3	1.7	3.5	5.8	5.1	4.6	10.7	9.1	6.1	2.4	1.7	1.0
15	1.3	1.6	3.7	5.9	4.9	4.4	10.3	9.5	5.7	2.3	1.6	1.0
16	1.3	1.6	3.7	5.9	4.6	4.7	10.2	10.2	5.2	2.2	1.4	1.0
17	1.3	1.6	3.9	5.7	4.9	5.1	9.6	10.3	4.9	2.4	1.3	1.0
18	1.2	1.7	4.4	5.7	5.1	5.7	9.8	10.5	4.6	2.3	1.4	.9
19	1.3	1.6	4.6	5.4	5.4	6.1	10.5	10.9	4.4	2.2	1.9	.9
20	1.3	1.7	3.5	5.4	5.4	6.5	11.2	10.9	3.9	2.1	1.9	.8
21	1.3	1.8	3.7	5.1	5.1	6.8	11.1	10.7	3.5	2.0	1.8	.8
22	1.3	1.7	3.9	5.0	4.9	7.5	10.9	10.9	3.4	2.0	1.7	.8
23	1.2	1.7	3.9	4.9	4.4	6.5	10.0	11.2	3.4	1.9	1.6	.8
24	1.1	1.6	4.1	4.6	4.4	7.1	9.5	10.9	5.4	1.7	1.5	.9
25	1.2	1.5	4.4	4.4	4.3	7.6	9.3	10.3	5.1	1.6	1.5	1.0
26	1.3	1.5	4.5	3.9	4.1	8.1	9.1	10.0	5.0	2.5	1.6	.9
27	1.3	1.6	4.6	4.4	4.1	8.4	9.0	9.8	4.9	2.5	1.4	.8
28	1.4	1.6	4.9	4.5	3.9	7.8	8.6	9.8	4.1	2.4	1.3	.8
29	1.3	1.7	5.1	4.6	.....	8.1	8.8	9.6	3.8	2.2	1.3	.9
30	1.4	1.8	5.4	4.6	.....	8.8	9.0	9.8	3.5	2.0	1.2	.8
31	1.5	.....	5.5	4.9	.....	8.4	.....	11.1	.....	1.9	1.2	.....

Monthly discharge of Curlew Creek near Curlew, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1.5	1.1	1.31	80.6
November	2.0	1.5	1.69	101
December	5.5	1.8	3.47	213
January	5.9	3.9	5.23	322
February	5.7	3.9	4.91	273
March	8.8	4.1	5.88	362
April	11.2	7.5	9.51	566
May	11.2	8.4	9.85	606
June	10.9	3.4	6.03	359
July	3.4	1.6	2.44	150
August	2.3	1.2	1.68	103
September	1.1	0.7	0.89	53
The year	11.2	0.7	4.40	3,190

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HALL CREEK BASIN.

HALL CREEK AT INCHELIUM, WASH.

LOCATION.—In NE. ¼ sec. 6, T. 32 N., R. 37 E., half a mile above highway bridge, three-fourths mile above mouth of creek, and three-fourths mile northwest of Inchelium, Ferry County.

DRAINAGE AREA.—163 square miles; former location at Wires bridge, 3 miles above mouth, 160 square miles (measured on topographic, Colville Indian Reservation, and Forest Service maps).

RECORDS AVAILABLE.—December 18, 1912, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank used since March 27, 1918; inspected by Walter Johnson. Stevens eight-day recorder in use with same installation, August 27, 1916, to March 27, 1918. For description of previous gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable 15 feet downstream or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of gravel and boulders; permanent except at extremely high stages. Banks high. Stage of zero flow, according to measurements made June 22 and September 17, 1917, and October 10, 1918, gage height 0.4 foot ± 0.05 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.57 feet at noon April 10 (discharge, 168 second-feet); minimum stage recorded, 1.24 feet September 28 (discharge, 8 second-feet); minimum discharge probably occurred during period in which stage-discharge relation was affected by ice.

1912-1918: Maximum stage recorded, 3.10 feet at 6.20 a. m. April 16, 1914 (discharge, 965 second-feet); minimum stage in 1918.

ICE.—Stage-discharge relation seriously affected by ice; flow estimated from observer's notes, weather records, and discharge measurements.

DIVERSIONS.—Water is diverted for use in Gwen mine power plant but is returned above gage.

REGULATION.—Effect of operation of power plant, negligible.

ACCURACY.—Stage-discharge relation permanent; affected by ice for short periods. Rating curve well defined below 500 second-feet. Operation of water-stage recorder satisfactory subsequent to March 27, but somewhat uncertain for short periods before that time. Daily discharge ascertained by applying to rating tables mean daily gage height determined from inspection of recorder graph. Records good.

Discharge measurements of Hall Creek at Inchelium, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 13	T. R. Newell	1.52	20.8	Apr. 6	T. R. Newell	2.17	82
Mar. 27	do	2.12	75	19	R. B. Kilgore	2.27	101
28	do	2.08	67	May 8	do	2.30	106

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Daily discharge, in second-feet, of Hall Creek at Inchelium, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16	23	21			18	102	104	51	18	13	10
2	16	23	20			19	91	106	52	18	13	10
3	16	25	20			21	79	106	52	17	17	12
4	16	31	20		12	21	84	106	50	17	16	10
5	16	26	16			20	81	106	49	17	13	10
6	17	23				17	84	102	47	17	13	10
7	17	21				17	87	98	45	18	13	10
8	16	20		23	20	20	96	104	44	16	12	10
9	16	20			20	19	125	102	42	16	15	10
10	17	19	14		19	18	160	95	40	17	17	10
11	17	19			20	18	160	89	38	18	16	10
12	17	20			20	18	160	87	37	18	14	10
13	16	20			20	20	150	82	35	19	13	10
14	16	20			18	20	141	79	34	16	13	10
15	16	20	19		16	20	129	81	32	16	12	10
16	16	20	21	22	22	20	119	87	31	16	12	10
17	16	19	26	21	20	23	112	87	30	15	12	10
18	16	19	30	21	19	31	106	82	28	13	13	10
19	16	18	34	15		40	102	81	26	12	16	9
20	16	18	33			41	104	79	25	11	16	9
21	17	19	28			43	119	76	24	12	15	9
22	17	19	25	14		49	121	74	24	12	15	9
23	17	19			11	59	121	71	26	12	14	9
24	18	19				60	123	69	36	14	12	9
25	18	20		20		66	121	67	28	13	11	9
26	18	19	21	20		77	114	66	24	14	11	9
27	19	19		21		71	110	64	21	21	11	8
28	20	19		22		61	106	60	21	18	11	8
29	20	20		16	.....	69	104	57	19	16	11	9
30	20	20		10	.....	84	104	54	18	15	11	9
31	21	.....		5	.....	102	.....	51	.....	14	11	.....

NOTE.—Stage-discharge relation affected by ice, Dec. 6–14, 23–31, Jan. 1–15, 20–24, 31, Feb. 1–7, 19–28, March 1; mean discharge estimated by periods as shown by braced figures. Recorder not operating Dec. 15, 20–22, Sept. 28–30; discharge estimated.

Monthly discharge of Hall Creek at Inchelium, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	21	16	17.1	1,050
November	31	19	20.6	1,230
December	.....	.....	20.3	1,250
January	.....	.....	19.6	1,210
February	.....	.....	14.6	811
March	102	17	38.1	2,340
April	160	79	114	6,780
May	106	51	83.0	5,100
June	52	18	34.3	2,040
July	21	11	15.7	965
August	17	11	13.3	818
September	12	8	9.6	571
The year	160	.....	33.4	24,200

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STRANGER CREEK BASIN.

STRANGER CREEK AT METEOR, WASH.

LOCATION.—In sec. 21, T. 32 N., R. 36 E., at highway bridge at Meteor, about 8 miles southwest of Inchelium, Ferry County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 29, 1916, to September 30, 1918.

GAGE.—Vertical staff on right bank 15 feet downstream from bridge; read by E. J. Sparling.

DISCHARGE MEASUREMENTS.—From highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel, apparently permanent. Left bank subject to overflow at extremely high stages. Concrete control 6 feet downstream from gage; permanent. Stage of zero flow, according to levels made October 11, 1918, gage height −0.06 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.78 foot April 28 to May 2 (discharge, 25 second-feet); minimum stage recorded, 0.06 foot September 20–23 (discharge, 0.6 second-foot).

1916–1918: Maximum stage recorded, 2.00 feet from May 15, afternoon reading, to May 19, 1917 (discharge, 164 second-feet); minimum stage in 1918.

ICE.—Stage-discharge relation affected by ice for short periods; flow estimated from recorded gage heights, observer's notes, and weather records.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Stranger Creek at Meteor, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 14	T. R. Newell	0.38	5.3	Apr. 19	R. B. Kilgore	0.75	22.5
Mar. 28	do	.51	10.0	May 7	do	.73	20.5
Apr. 6	do	.60	14.2	7	do	.73	21.0

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Daily discharge, in second-feet, of Stranger Creek at Meteor, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.8	2.3	3.5	6.2		5.6	12.4	25	12.9	5.6	2.8	1.0
2	2.8	2.4	3.5	5.9		5.6	12.4	25	12.4	5.6	3.0	1.0
3	2.8	2.6	3.5	5.9	4.5	6.2	13.3	24	12.4	5.0	2.8	1.0
4	2.6	2.8	3.5	5.9		5.9	13.8	24	12.4	5.0	2.8	.9
5	2.6	2.8	3.0	5.9		5.6	14.2	23	12.0	5.0	2.6	.9
6	2.6	2.8	3.5	6.2	5.0	5.6	14.2	22	12.0	4.7	2.4	.9
7	2.6	2.8	3.5	6.2	5.3	5.6	14.2	21	11.6	4.4	2.3	.9
8	2.6	2.8		6.2	5.6	5.6	15.1	22	11.6	4.4	2.1	.9
9	2.6	2.8	3.5	5.6	6.2	5.6	16.1	22	11.2	4.4	2.1	.9
10	2.6	2.8	3.5	5.0	6.2	5.6	16.1	22	10.7	4.4	2.1	.8
11	2.6	2.8	3.5		6.2	5.6	17.2	21	9.9	4.4	2.1	.8
12	2.6	3.0	3.5		5.9	5.6	18.3	21	9.5	5.0	2.1	.8
13	2.6	3.0	3.5	5.0	5.6	6.2	18.9	21	9.1	4.7	1.8	.8
14	2.6	3.0	3.7		5.6	6.2	21	19.5	9.1	4.4	1.8	.8
15	2.6	3.0	3.9		5.6	6.2	21	19.5	9.1	3.9	1.8	.7
16	2.4	3.0	4.7	6.2	5.6	5.9	21	19.5	8.4	3.9	1.8	.7
17	2.4	3.0	5.0	6.2	5.9	6.6	22	18.9	8.4	3.5	1.7	.7
18	2.4	3.0	5.3	6.2	5.9	6.9	21	18.9	7.6	3.5	1.8	.7
19	2.4	3.0	5.9	6.2	5.9	6.9	23	18.3	7.6	3.1	1.8	.7
20	2.4	3.0	6.2			7.3	23	18.3	7.6	3.0	1.7	.6
21	2.4	3.0	6.2	6.0	5.0	7.6	23	17.2	7.3	3.0	1.7	.6
22	2.3	3.0	6.2		5.0	9.1	23	17.2	7.3	3.0	1.7	.6
23	2.3	3.0	6.2	6.2	5.0	9.1	24	16.1	7.6	3.0	1.6	.6
24	2.3	3.0		6.2	5.0	9.5	24	16.1	7.6	3.1	1.6	.7
25	2.3	3.0		6.2	5.0	10.7	24	15.6	7.6	3.0	1.3	.8
26	2.3	3.0	6.0	6.2	5.0	10.7	24	14.7	7.3	3.9	1.3	.7
27	2.3	3.0		6.2	5.0	10.7	24	14.7	6.9	3.3	1.2	.7
28	2.3	3.0		6.2	5.6	10.3	25	14.2	6.6	3.0	1.1	.7
29	2.3	3.1		5.6	.....	11.6	25	14.2	6.6	2.8	1.1	.7
30	2.3	3.3	5.9	5.6	.....	11.6	25	13.8	6.2	2.8	1.1	.7
31	2.3	.....	5.9	5.0	.....	12.4	.....	13.3	.....	2.8	1.0	.....

NOTE.—Braced figures show estimated mean discharge for periods indicated, during which stage-discharge relation was affected by ice.

Monthly discharge of Stranger Creek at Meteor, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2.8	2.3	2.48	152
November	3.3	2.3	2.90	173
December	6.2	3.0	4.71	290
January	6.2	.....	5.81	357
February	6.2	.....	5.31	295
March	12.4	5.6	7.53	463
April	25	12.4	19.6	1,170
May	25	13.3	19.1	1,170
June	12.9	6.2	9.22	549
July	5.6	2.8	3.92	241
August	3.0	1.0	1.87	115
September	1.0	.6	.78	46.4
The year	25	.6	6.94	5,020

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SPOKANE RIVER BASIN.

COEUR D'ALENE LAKE AT COEUR D'ALENE, IDAHO.

LOCATION.—In SW. ¼ SW. ¼ sec. 13, T. 50 N., R. 4 W., at Johnson's wharf, 800 feet southeast of railroad station at Coeur d'Alene, Kootenai County.

DRAINAGE AREA.—3,690 square miles (measured on U. S. Geol. Survey map; scale, 1:500,000).

RECORDS AVAILABLE.—February 11, 1905, to September 30, 1918. April 25, 1903, to February 10, 1905, St. Joe Boom Co.'s gage at mouth of St. Joe River.

GAGE.—Vertical staff on pile at wharf; read by Henry Kloppenburg. Gage datum is 2,100 feet above mean sea level.

EXTREMES OF STAGE.—Maximum stage recorded during year 35.92 feet January 3; minimum stage recorded, 20.52 feet November 28 and 29.

1903–1918: Maximum stage recorded in 1918; minimum stage recorded, 19.9 feet on October 10–12, 1904, September 24–25, 1905, October 14 to November 3, 1906.

DIVERSIONS.—None.

REGULATION.—Considerable storage is used by the Washington Water Power Co. to increase summer flow of Spokane River; regulation is effected by Taintor gates and bear-trap dam at Post Falls.

ACCURACY.—Gage read to hundredths once daily.

COOPERATION.—Gage-height record furnished by the Washington Water Power Co.

Daily gage height, in feet, of Coeur d'Alene Lake at Coeur d'Alene, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	23.14	21.42	20.64	34.65	25.92	24.07	28.60	29.24	26.51	26.31	26.00	25.22
2	23.06	21.36	20.64	35.45	25.72	23.98	28.76	29.32	26.45	26.32	25.98	25.14
3	23.02	21.32	20.66	35.92	25.60	23.92	28.84	29.36	26.36	26.29	25.95	25.12
4	23.00	21.26	20.74	35.85	25.44	23.85	28.76	29.48	26.35	26.28	25.92	25.10
5	22.96	21.24	20.74	35.58	25.34	23.82	28.64	29.66	26.33	26.26	25.90	25.08
6	22.90	21.20	20.78	35.25	25.44	23.74	28.52	29.90	26.34	26.26	25.88	25.06
7	22.84	21.16	20.82	34.89	25.72	23.67	28.40	29.96	26.40	26.25	25.86	25.02
8	22.78	21.12	20.84	34.58	26.12	23.61	28.36	29.92	26.44	26.25	25.84	24.98
9	.....	21.06	20.78	34.24	26.32	23.55	28.32	29.80	26.47	26.26	25.82	24.92
10	22.68	21.00	20.82	33.90	26.36	23.49	28.52	29.64	26.49	26.26	25.80	24.88
11	22.62	20.96	20.86	33.34	26.40	23.45	28.90	29.36	26.52	26.28	25.76	24.86
12	22.56	20.92	20.82	32.86	26.44	23.46	29.30	29.14	26.52	26.27	25.74	24.84
13	22.52	20.88	20.84	32.36	26.42	23.56	29.60	28.86	26.50	26.26	25.72	24.78
14	22.46	20.84	20.94	31.86	26.30	23.59	29.90	28.68	26.48	26.24	25.68	24.74
15	22.38	20.82	21.20	31.36	26.24	23.59	30.10	28.64	26.45	26.22	25.66	24.68
16	22.34	20.80	21.52	30.86	26.04	23.62	30.14	28.66	26.30	26.22	25.64	24.66
17	22.24	20.76	21.82	30.38	25.94	23.68	30.06	28.66	26.20	26.22	25.62	24.64
18	22.20	20.74	22.40	30.00	25.76	23.90	29.88	28.62	26.15	26.20	25.58	24.62
19	22.14	20.72	24.10	29.58	25.60	24.34	29.66	28.54	26.28	26.20	25.58	24.58
20	22.10	20.68	26.32	29.15	25.40	24.73	29.42	28.44	26.23	26.16	25.56	24.54
21	22.00	20.64	27.29	28.80	25.14	24.99	29.18	28.32	26.29	26.12	25.56	24.50
22	21.96	20.62	27.57	28.44	24.94	25.23	29.14	28.16	26.32	26.10	25.56	24.46
23	21.90	20.60	27.73	28.08	24.84	25.54	29.18	28.00	26.33	26.06	25.56	24.42
24	21.86	20.58	28.00	27.76	24.74	25.99	29.32	27.78	26.26	26.04	25.54	24.38
25	21.78	20.56	28.08	27.52	24.64	26.44	29.36	27.58	26.19	26.02	25.52	24.34
26	21.74	20.54	28.03	27.34	24.46	26.99	29.46	27.40	26.23	26.02	25.52	24.30
27	21.72	20.54	28.09	27.14	24.32	27.56	29.52	27.24	26.26	26.03	25.48	24.26
28	21.64	20.52	28.64	26.96	24.20	28.05	29.44	27.04	26.27	26.04	25.44	24.22
29	21.60	20.52	29.74	26.74	.....	28.24	29.34	26.88	26.27	26.04	25.40	24.20
30	21.54	20.56	31.33	26.46	.....	28.36	29.26	26.74	26.29	26.02	25.36	24.16
31	21.48	.....	33.19	26.24	.....	28.46	.....	26.62	.....	26.02	25.32	.....

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SPOKANE RIVER AT SPOKANE, WASH.

LOCATION.—In sec. 9, T. 25 N., R. 43 E., above Washington Water Power Co.'s steam plant in Spokane, 2.8 miles above Spokane Falls, and 4 miles above Latah Creek, Spokane County.

DRAINAGE AREA.—3,910 square miles (measured on U. S. Geol. Survey base map, scale, 1:500,000).

RECORDS AVAILABLE.—March 22, 1891, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank 500 feet above Washington Water Power Co.'s steam plant; installed July 31, 1915; inspected daily by power plant attendant. For description of earlier gages see Water-Supply Paper 412. Approximate elevation of gage datum, 1,800 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from cable 75 feet upstream from gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; somewhat shifting. Control is stretch of channel contracted by bridge structures and embankments between station and crest of Spokane Falls; shifts at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 83.5 feet at 8 a. m. January 4 (discharge, 39,600 second-feet); minimum stage, from water-stage recorder, 68.90 feet at 7 p. m. December 9 (discharge 1,520 second-feet).

1891–1918: Maximum stage recorded, 83.8 feet at midnight May 17, 1917 (discharge, 41,900 second-feet); minimum stage recorded, 1.3 feet (Martha Street gage) September 28–30, 1905 (discharge, 1,240 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Water is diverted above the station for irrigation by Spokane Valley Land & Water Co.

REGULATION.—Flow is partly regulated by storage in Coeur d'Alene Lake.

ACCURACY.—Stage-discharge relation changed on April 16. Rating curves before and after change well defined. Water-stage recorder in continuous operation except December 29 to March 7, during which period it was removed on account of danger from high water. Staff gage read once daily throughout the year; to half-tenths until May 3, and to hundredths thereafter. Daily discharge ascertained by applying to rating table mean daily gage-height determined by inspecting recorder graph or, for days of considerable fluctuation by averaging discharge for shorter interval. Daily staff gage readings used December 29 to March 7. Records excellent.

COOPERATION.—Gage-height record furnished by Washington Water Power Co.

Discharge measurements of Spokane River at Spokane, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 9	John McCombs	69.62	2,320	Apr. 27	R. B. Kilgore	77.11	17,100
Feb. 17	T. R. Newell	73.92	9,810	29	do	76.98	16,800
19	do	73.62	9,120				

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Daily discharge, in second-feet, of Spokane River at Spokane, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,360	2,180	1,570	33,500	10,400	6,510	14,700	16,600	10,700	2,980	1,830	1,830
2	2,300	2,300	1,620	37,300	9,530	6,320	15,200	16,800	10,000	2,920	1,830	1,830
3	2,300	2,240	1,680	39,300	8,480	6,320	15,200	16,800	9,180	2,860	1,830	1,830
4	2,300	2,120	1,680	39,600	9,110	6,320	15,200	17,100	8,150	2,660	1,830	1,780
5	2,300	2,300	1,680	39,300	8,900	5,950	15,200	17,400	8,760	2,600	1,780	1,720
6	2,300	2,300	1,680	38,500	9,110	5,950	14,700	17,900	8,550	2,530	1,780	1,720
7	2,240	2,300	1,680	36,900	9,320	5,950	14,700	18,200	8,760	2,410	1,780	1,720
8	2,240	2,240	1,620	35,800	9,970	5,590	14,400	18,200	10,200	2,410	1,780	1,780
9	2,300	2,240	1,570	34,200	10,400	5,590	14,400	17,900	10,200	2,290	1,830	1,720
10	2,300	2,300	1,570	33,100	10,600	5,590	14,700	17,400	10,500	2,290	1,780	1,720
11	2,300	2,120	1,620	31,300	10,800	5,410	15,500	16,800	10,500	2,230	1,830	1,720
12	2,300	2,180	1,620	29,800	10,800	5,410	16,300	16,300	10,500	2,170	1,830	1,720
13	2,180	2,120	1,680	27,700	10,600	5,590	17,400	15,800	10,500	2,170	1,830	1,720
14	2,240	2,000	1,620	25,900	10,400	5,590	17,900	15,200	10,500	2,170	1,830	1,720
15	2,240	2,000	1,680	24,300	10,400	5,590	18,500	15,200	10,200	2,110	1,830	1,780
16	2,300	1,900	1,620	22,600	9,970	5,590	18,800	15,200	9,600	2,050	1,830	1,780
17	2,360	1,840	1,680	21,400	9,970	5,590	17,900	15,200	8,770	2,050	1,830	1,720
18	2,300	1,840	1,780	20,200	9,530	5,770	17,900	15,200	6,160	2,050	1,830	1,720
19	2,300	1,950	2,120	19,000	9,320	6,320	17,400	15,000	4,790	2,050	1,880	1,720
20	2,300	1,950	3,200	17,900	8,900	7,080	17,100	14,700	6,570	2,050	1,780	1,780
21	2,360	1,840	9,860	16,800	8,690	7,480	16,600	14,500	4,530	2,050	1,720	1,780
22	2,300	1,780	11,100	15,800	8,280	7,880	16,300	14,200	4,850	2,050	1,780	1,780
23	2,300	1,680	11,800	15,200	7,880	8,280	16,300	13,700	5,550	2,000	1,780	1,720
24	2,240	1,680	12,200	14,200	7,880	9,110	16,800	13,200	6,980	2,000	1,780	1,780
25	2,360	1,680	13,200	13,700	7,480	9,970	16,800	13,000	5,160	1,940	1,830	1,720
26	2,300	1,730	13,700	13,200	7,480	10,800	16,800	12,500	3,400	1,880	1,780	1,720
27	2,180	1,680	14,200	12,700	7,080	12,200	17,100	12,000	3,260	1,880	1,720	1,720
28	2,120	1,620	14,400	12,500	6,700	13,400	16,800	11,800	3,330	1,880	1,720	1,780
29	2,180	1,620	17,400	11,800	.....	14,000	16,800	11,600	3,400	1,880	1,620	1,780
30	2,360	1,620	21,400	11,300	.....	14,200	16,800	11,100	3,060	1,830	1,670	1,780
31	2,300	.....	27,300	10,800	.....	14,400	.....	10,900	.....	1,830	1,720	.....

Monthly discharge of Spokane River at Spokane Wash., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2,120	2,000	2,070	127,000
November	2,610	2,060	2,300	137,000
December	2,420	2,180	2,330	143,000
January	2,420	2,180	2,330	143,000
February	3,140	2,240	2,780	154,000
March	3,350	2,540	2,890	178,000
April	26,500	3,350	14,200	845,000
May	41,500	24,500	32,900	2,020,000
June	37,700	16,000	25,800	1,540,000
July	15,500	3,000	6,470	398,000
August	3,000	2,480	2,730	168,000
September	2,600	2,360	2,430	145,000
The year	41,500	2,000	8,290	6,000,000

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Monthly discharge of Spokane River at Spokane, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2,360	2,120	2,280	140,000
November	2,300	1,620	1,980	118,000
December	27,300	1,570	6,500	400,000
January	39,600	10,800	24,400	1,500,000
February	10,800	6,700	9,210	512,000
March	14,400	5,410	7,730	475,000
April	18,800	14,400	16,300	970,000
May	18,200	10,900	15,100	928,000
June	10,700	3,050	7,550	449,000
July	2,980	1,830	2,200	135,000
August	1,830	1,620	1,790	110,000
September	1,830	1,720	1,750	104,000
The year	39,600	1,570	8,070	5,840,000

SPOKANE RIVER BELOW LITTLE FALLS, NEAR LONG LAKE, WASH.

LOCATION.—In NW. ¼ sec. 19, T. 27 N., R. 39 E., in Lincoln County, just above Chamokane ferry, 1½ miles below Little Falls power plant of Washington Water Power Co., 4 miles below Chamokane Creek, and 5 miles below Long Lake.

DRAINAGE AREA.—5,690 square miles (measured on U. S. Geol. Survey maps; scale, 1:500,000).

RECORDS AVAILABLE.—November 5, 1912, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank; gage datum 1,200 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet below gage.

CHANNEL AND CONTROL.—Bed composed of large boulders; shifting at high stages. No well-defined control. Banks high; one channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 89.8 feet at 6 p. m. January 3 (discharge 39,400 second-feet); minimum mean daily discharge, 1,720 second-feet September 15; minimum discharge lower when water was below intake (elevation, 75.05 feet) for short periods on July 29, August 4 and 31, and many days in September.

1912–1918: Maximum stage recorded, 90.32 feet at 8.30 p. m. May 18, 1917 (discharge, 41,300 second-feet); minimum stage same as above, and for parts of days during low-water seasons.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Water is diverted by Spokane Valley Land & Water Co. for irrigation above station.

REGULATION.—Flow affected considerably by power regulation at Little Falls and Long Lake, and slightly by power regulation at Ninemile, Spokane, and Post Falls. Low-water flow is affected by regulation of storage in Coeur d'Alene Lake.

ACCURACY.—Stage-discharge relation changed January 6 during high water. Rating curves well defined. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by means of discharge integrator except for periods when recorder was out of order, and for period December 29 to January 23, for which mean daily gage height determined by inspecting recorder graph was applied to rating table. Records excellent.

COOPERATION.—Gage-height record furnished by Washington Water Power Co.

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Discharge measurements of Spokane River below Little Falls, near Long Lake, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 10	John McCombs	77.17	4,270
Apr. 4	T. R. Newell	83.27	16,900

Daily discharge, in second-feet, of Spokane River below Little Falls, near Long Lake, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,980	3,030	2,480	28,200	11,700	7,460	15,600	18,800	12,300	4,300	2,390	1,950
2	2,960	2,990	2,380	33,300	11,000	7,240	16,000	18,600	12,000	3,970	2,430	2,000
3	2,940	2,930	2,440	37,900	10,400	7,520	16,400	18,700	11,100	3,780	2,380	2,030
4	3,020	2,840	2,550	38,700	10,300	7,660	16,500	18,900	10,000	2,840	2,080	2,210
5	2,980	2,960	2,660	38,700	10,400	7,520	16,500	19,100	9,850	3,710		2,330
6	3,080	3,050	2,610	38,700	11,400	7,210	16,500	19,500	10,300	3,310		2,250
7	2,810	2,990	2,580	38,300	12,200	7,020	16,500	20,000	10,600	2,710		2,250
8	3,070	3,070	2,620	37,600	12,400	6,860	16,400	20,500	10,600	3,420		2,080
9	3,080	2,750	2,420	36,500	12,300	6,710	16,200	20,300	11,100	3,240	2,310	2,170
10	3,140	2,850	2,540	35,100	12,300	6,560	16,300	20,000	11,300	3,060		2,310
11	3,100	2,770	2,480	33,600	12,100	6,570	16,600	19,500	11,500	2,970		2,280
12	2,890	2,950	2,520	31,800		6,680	17,400	18,800	11,600	2,840		2,180
13	3,070	2,980	2,480	30,400		7,020	18,100	18,100	11,600	2,780	2,350	2,140
14	2,720	3,100	2,400	28,600		7,080	19,000	17,600	11,500	2,470	2,300	2,120
15	3,000	3,060	2,390	27,200	12,000	7,120	19,800	17,300	11,400	2,630	2,280	1,720
16	3,060	2,910	2,340	25,500		7,240	20,300	17,300	11,000	2,810	2,270	2,110
17	2,950	2,960	2,490	24,200		7,240	20,300	17,000	10,500	2,770	2,180	2,250
18	3,090	2,410	2,400	22,800		7,280	20,200	17,000	9,380	2,700	1,920	2,050
19	2,780	2,650	2,260	20,500	10,400	7,820	19,600	16,900	7,160	2,660	2,170	2,100
20	3,080	2,720	2,560	19,500	9,980	8,500	19,200	16,800	6,890	2,600	2,340	2,140
21	2,650	2,660	4,210	19,200	9,550	8,890	18,700	16,600	6,720	2,320	2,390	2,140
22		2,590	8,320	18,300	9,250	9,160	18,300	16,300	5,830		2,330	1,880
23		2,620	10,100	17,400	9,100	9,520	17,900	15,800	5,670		2,360	2,200
24		2,530	11,100	16,300	8,830	9,980	18,100	15,500	6,430		2,220	2,080
25		2,340	11,700	15,500	8,560	10,800	18,300	15,100	6,640	2,510	1,930	2,050
26	2,800	2,410	12,900	15,200	8,340	11,600	18,600	14,600	5,710		2,260	2,160
27		2,520	13,400	15,000	7,830	12,700	19,000	14,100	4,770		2,390	2,100
28		2,500	13,800	14,500	7,650	13,900	19,100	13,700	4,820		2,450	1,990
29		2,340	16,400	13,900	.....	14,700	19,100	13,200	4,610	2,430	2,400	1,920
30	2,810	2,400	19,700	13,100	.....	15,200	18,800	12,800	3,650	2,490	2,320	2,270
31	2,920	.....	23,500	12,200	.....	15,400	.....	12,400	.....	2,560	2,280	.....

NOTE.—Braced figures show mean discharge for periods indicated; discharge for first period estimated from discharge at Spokane, and for remaining periods estimated from gage-height record on tailrace of power plant 1½ miles upstream.

Monthly discharge of Spokane River below Little Falls, near Long Lake, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	3,140	2,650	2,920	180,000
November	3,100	2,340	2,760	164,000
December	23,500	2,260	6,280	386,000
January	38,700	12,200	25,700	1,580,000
February	12,400	7,650	10,700	594,000
March	15,400	6,560	8,910	548,000
April	20,300	15,600	18,000	1,070,000
May	20,500	12,400	17,100	1,050,000
June	12,300	3,650	8,880	528,000
July	4,300	2,320	2,870	176,000
August	2,450	1,920	2,290	141,000
September	2,330	1,720	2,120	126,000
The year	38,700	1,720	9,060	6,540,000

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NESPELEM RIVER BASIN.

NESPELEM RIVER AT NESPELEM, WASH.

LOCATION.—In SE. ¼ sec. 24, T. 31 N., R. 30 E., half a mile above Nespelem, Okanogan County, 5 miles above Little Nespelem River, and 6 miles above mouth.

DRAINAGE AREA.—122 square miles (measured on map of Colville Indian Reservation, edition of 1911).

RECORDS AVAILABLE.—May 1, 1911, to September 30, 1918.

GAGE.—Vertical staff on left bank at gaging bridge, installed October 19, 1916; read by Charles Kronk; inclined staff which was read during 1916, used October 5 to December 14, 1917. Prior to July 30, 1913, gage was about 1,000 feet upstream at different datum; July 30, 1913, to November 4, 1915, vertical staff at same site as present gage but at datum 0.38 foot lower; November 5, 1915, to October 18, 1916, inclined staff at same site as present gage but at datum 0.47 foot lower.

DISCHARGE MEASUREMENTS.—Made from gaging bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; overgrown with aquatic plants during summer. Concrete control built in November, 1915; new concrete control built at same site in October, 1916; permanent. Right bank flat; subject to overflow at gage height 4.0 feet; left bank high; not subject to overflow. Stage of zero flow for new control, according to measurements made October 3, 1917, and October 15, 1918, gage height 0.4 foot ± 0.05 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.28 feet, March 3 (discharge, 51 second-feet); minimum stage recorded, 0.78 foot September 3–30 (discharge, 8.0 second-feet).

1911–1918: Maximum stage recorded, 4.75 feet at 9 a. m. April 16, 1914 (discharge, 442 second-feet); minimum stage recorded January 16–27 and March 1 and 2, 1917 (discharge, 6.7 second-feet).

ICE.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—Above all diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read once daily to hundredths. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

Discharge measurements of Nespelem River at Nespelem, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.		Discharge.	Date.	Made by—	Gage height.		Discharge.
		Inclined gage.	Vertical gage.				Inclined gage.	Vertical gage.	
		Feet.	*Feet.*	*Sec.-ft.*			*Feet.*	*Feet.*	*Sec.-ft.*
Oct. 3	John McCombs	1.28	0.81	8.6	Apr. 11	T. R. Newell	1.71	1.24	44.8
4	do	1.28	.81	9.4	24	R. B. Kilgore		1.24	48.7
Apr. 1	T. R. Newell	1.59	1.13	32.3	24	do		1.24	47.5
2	do		1.14	33.7	25	do		1.24	45.4
10	do	1.68	1.22	42.9					

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Daily discharge, in second-feet, of Nespelem River at Nespelem, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.5	9.0	10.1	11.2	11.7	15.2	33	40	20	10.6	8.2	8.2
2	9.0	9.0	10.6	11.7	11.2	16	34	39	19.6	9.6	9.6	8.2
3	9.0	9.0	10.6	11.7	11.2	51	33	37	18.8	9.6	9.0	8.0
4	9.0	9.0	10.6	12.2	11.7	42	34	36	18.1	9.6	8.2	8.0
5	8.5	10.1	10.1	12.2	12.2	37	34	35	18.1	9.6	8.2	8.0
6	8.5	9.6	10.1	12.7	29	19.6	35	34	17.4	9.6	8.2	8.0
7	8.5	9.6	10.1	13.8	17.4	17.4	35	34	17.4	9.6	8.2	8.0
8	8.5	9.6	10.1	13.8	13.3	15.2	37	34	17.4	9.6	8.2	8.0
9	8.5	9.6	9.6	13.3	13.8	13.8	39	35	16.7	9.6	8.2	8.0
10	8.5	9.6	9.6	12.7	13.3	13.8	44	34	16	9.0	8.2	8.0
11	8.5	9.6	10.1	12.2	13.3	14.5	46	33	14.5	8.5	8.2	8.0
12	8.5	10.1	10.1	12.2	13.3	14.5	49	31	13.8	8.5	8.2	8.0
13	8.5	10.1	10.1	12.2	13.8	16	50	30	13.8	8.5	8.2	8.0
14	8.5	10.1	10.1	12.2	13.3	16	50	29	13.3	8.5	8.2	8.0
15	8.5	9.6	10.6	12.2	13.3	17	48	30	13.3	9.6	8.2	8.0
16	8.5	9.6	10.6	12.2	13.3	17	46	31	13.3	8.5	8.5	8.0
17	9.0	9.6	11.2	12.2	13.3	18	44	33	13.3	8.5	8.5	8.0
18	9.0	9.6	11.7	12.7	13.3	18	41	31	12.7	8.2	8.5	8.0
19	9.0	9.6	12.2	13.3	13	19	40	30	12.7	8.2	8.5	8.0
20	9.0	10.1	11.7	13.3	13	19.6	41	29	12.2	8.2	8.2	8.0
21	9.0	10.1	11.7	12.7	12.7	20.3	42	29	11.7	8.2	8.2	8.0
22	9.0	10.1	11.7	12.7	12.7	21	45	28	11.2	8.2	8.2	8.0
23	9.0	9.6	11.7	12.2	13.3	21	46	27	11.2	8.2	8.2	8.0
24	9.0	9.6	11.2	12.2	13.3	21	46	27	11.7	9.0	8.2	8.0
25	9.0	10.1	11.2	12.2	13.3	22	46	26	11.7	9.0	8.2	8.0
26	9.0	10.1	11.2	11.7	12.7	23	46	26	11.2	11.2	8.2	8.0
27	9.0	10.1	10.6	11.7	13.8	23	48	25	11.2	10.1	8.2	8.0
28	9.0	10.1	10.6	11.7	14.5	24	48	24	11.2	10.1	8.2	8.0
29	9.0	10.1	10.6	11.7	.....	26	46	23	11.2	9.6	8.2	8.0
30	9.0	10.1	11.2	11.7	.....	26	44	23	11.2	9.0	8.2	8.0
31	9.0	.....	11.2	11.7	.....	29	.....	21	.....	8.5	8.2	.....

NOTE.—Gage not read, discharge interpolated; Oct. 1, 2, 4, 8, 9, Jan. 15, 29, 30, Feb. 4, 19, 20, Mar. 14-19, and Sept. 22.

Monthly discharge of Nespelem River at Nespelem, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9.0	8.5	8.79	540
November	10.1	9.0	9.74	580
December	12.2	9.6	10.7	658
January	13.8	11.2	12.3	756
February	29	11.2	13.7	761
March	51	13.8	21.5	1,320
April	50	33	42.3	2,520
May	40	21	30.5	1,880
June	20	11.2	14.2	845
July	11.2	8.2	9.12	561
August	9.6	8.2	8.31	511
September	8.2	8.0	8.01	477
The year	51	8.0	15.8	11,400

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OKANOGAN RIVER BASIN.

OKANOGAN RIVER AT OKANOGAN, WASH.

LOCATION.—In sec. 16, T. 33 N., R. 26 E., at Okanogan, Okanogan County, a quarter of a mile above Salmon Creek.

DRAINAGE AREA.—7,740 square miles (measured on topographic maps and maps of Okanogan National Forest, Colville Indian Reservation, and Canadian railway belt).

RECORDS AVAILABLE.—May 10, 1911, to September 30, 1918.

GAGE.—Inclined and vertical staff on left bank 300 feet above steamboat dock at Okanogan, installed March 3, 1917; read by C. R. Altman. Prior to October 21, 1915, and from April 28 to August 27, 1916, vertical staff attached to steamboat dock; October 21, 1915, to April 27, 1916, and August 28, 1916, to March 2, 1917, inclined gage at same site as present gage. All gages at same datum.

DISCHARGE MEASUREMENTS.—Made from boat at gage or from highway bridge at Omak, 4 miles upstream.

CHANNEL AND CONTROL.—Bed composed of boulders and cobblestones; likely to shift at extremely high water. No well-defined control. Banks fairly high. One channel at all stages. Stage of zero flow estimated on October 4, 1918, gage height −2.4 feet ±0.5 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.2 feet June 15 (discharge, 16,200 second-feet); minimum stage recorded, 1.50 feet December 28 (discharge, 520 second-feet).

1911–1918: Maximum stage recorded, 12.21 feet June 20, 1916 (discharge, 22,200 second-feet); minimum stage same as above.

ICE.—Stage-discharge relation not affected during year.

DIVERSIONS.—Numerous small ditches divert water for irrigation above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read once daily to hundredths, except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying daily gage height to rating table. Records good except for period estimated.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Okanogan River at Okanogan, Wash., during the year ending Sept. 30, 1918.

[Made by L. D. Carson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Feb. 10	2.80	1,460	June 17	9.85	13,200
Apr. 6	2.48	1,080	20	8.88	11,100
9	2.61	1,210			

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Daily discharge, in second-feet, of Okanogan River at Okanogan, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,030	[a] 960	1,180	[a] 2,730	1,180	1,100	1,180	6,450	11,300	5,930	2,360	[a] 1,260
2	1,030	[a] 960	[a] 1,140	4,360	1,180	1,100	1,180	7,530	10,000	5,440	2,250	[a] 1,220
3	1,030	960	1,100	5,600	1,100	[a] 1,060	1,180	8,700	8,900	5,120	2,250	1,180
4	1,030	[a] 1,000	1,100	4,070	1,080	1,030	1,180	10,000		[a] 4,890	[a] 2,200	1,180
5	1,030	1,030	1,030	3,550	1,180	1,030	1,180	[a] 10,800		4,660	2,140	1,100
6	1,100	1,030	1,030		1,430	960	1,100	11,700	11,500	4,510	2,080	1,100
7	[a] 1,100	1,180	960		1,520	960	[a] 1,140	10,900		[a] 4,290	1,920	1,030
8	1,100	[a] 1,140	890		1,430	890	1,180	16,000		4,070	1,920	[a] 1,080
9	1,030	1,100	[a] 940		1,340	890	1,180	9,300		4,070	1,820	1,030
10		1,100	[a] 1,000		1,340	[a] 920	1,180	8,500	13,600	3,930	1,820	1,030
11		[a] 1,100	[a] 1,050		1,430	960	1,260	8,100	15,200	4,070	[a] 1,820	960
12		[a] 1,100	1,100		1,380	890	1,520	[a] 8,700	16,000	3,800	1,820	960
13		[a] 1,100	1,030		1,340	960	1,720	9,300	16,000	4,070	1,820	890
14		[a] 1,100	1,030		1,340	890	[a] 1,880	10,600	16,000	[a] 3,810	1,920	890
15		1,100	[a] 1,000	2,180	1,260	960	2,080	12,000	16,200	3,550	1,820	[a] 890
16		1,100	960		1,100	960	2,030	12,900	16,000	3,430	1,820	890
17		1,100	960		1,060	[a] 1,030	2,030	12,400	12,900	3,550	1,720	830
18		[a] 1,060	960		1,030	1,100	1,920	12,000	12,400	3,550	[a] 1,770	830
19		1,030	1,080		960	1,080	1,920	[a] 11,200	12,000	3,190	1,820	830
20	1,000	1,030	[a] 1,030		960	960	1,820	10,400	11,100	3,190	1,820	830
21		1,030	1,030		960	960	[a] 2,200	9,600	10,200	[a] 3,070	1,820	830
22		1,030	1,180		1,000	890	2,590	8,500	10,000	2,950	1,820	[a] 830
23		1,520	[a] 1,040		1,080	960	3,670	8,100	9,300	2,830	1,720	880
24		1,920	890	2,140	1,030	[a] 960	4,070	7,530	9,300	2,710	1,720	770
25		[a] 1,680	[a] 920	1,920	1,030	960	4,510	7,170	8,900	2,590	1,520	770
26		1,430	960	1,520	1,100	890	4,360	[a] 6,810	8,500	2,590	1,520	770
27		1,340	960	[a] 1,480	1,100	890	4,360	6,450	7,910	2,590	1,420	770
28		1,340	520	1,430	1,100	[a] 950	[a] 4,510	6,270	7,350	[a] 2,650	1,430	770
29		1,260	890	1,430	.....	[a] 1,010	4,660	6,270	6,810	2,710	1,430	[a] 770
30		1,180	[a] 1,000	[a] 1,300	.....	[a] 1,070	5,280	7,350	[a] 6,370	2,590	1,340	770
31		.....	1,100	1,180	.....	[a] 1,130	.....	8,700	.....	2,470	[a] 1,300	.....

[a] Interpolated.

NOTE.—Braced figures show mean discharge for periods indicated; estimated by comparison with record of Similkameen River near Oroville.

Monthly discharge of Okanogan River at Okanogan, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,100	.....	1,020	62,700
November	1,920	960	1,170	69,600
December	1,180	520	1,000	61,500
January	5,600	1,180	2,320	143,000
February	1,520	960	1,180	65,500
March	1,130	890	979	60,200
April	5,280	1,100	2,330	139,000
May	12,900	6,270	9,170	564,000
June	16,200	6,370	11,400	678,000
July	5,930	2,470	3,640	224,000
August	2,360	1,300	1,800	111,000
September	1,260	770	928	55,200
The year	16,200	520	3,080	2,230,000

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SIMILKAMEEN RIVER NEAR OROVILLE, WASH.

LOCATION.—In SE. ¼ sec. 13, T. 40 N., R. 26 E., at Okanogan Valley Power Co.'s plant, 4 miles above Oroville, Okanogan County, 5 miles above mouth; below all tributaries.

DRAINAGE AREA.—3,450 square miles (measured on topographic maps and Canadian railway belt maps).

RECORDS AVAILABLE.—May 14, 1911, to September 30, 1918.

GAGE.—Vertical staff in seven sections on left bank—three sections 15 feet above tailrace and four sections fastened to power house; read by A. W. Mitchell.

DISCHARGE MEASUREMENTS.—Made from highway bridge at Oroville, 4 miles downstream.

CHANNEL AND CONTROL.—Narrow canyon at gage and control; fairly permanent. Banks high, not subject to overflow. Lower falls (25 feet high) 150 feet upstream from gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.2 feet at 11 p. m. June 14 (discharge, 17,200 second-feet); minimum stage recorded 1.10 feet September 22-24 (discharge, 348 second-feet).

1911-1918: Maximum stage recorded, 18.3 feet at 7 a. m. June 19, 1916 (discharge, 20,600 second-feet). Minimum discharge uncertain, but estimated at 230 second-feet January 31, 1917, when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation seriously affected by ice; flow estimated from observer's notes, weather records, and discharge measurements.

DIVERSIONS.—Some water is diverted for irrigation from tributaries above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed gradually during the summer; affected by ice for short periods. Rating curve well defined. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table; shifting-control method used June 23 to September 30. Records excellent from October to June, except for periods when stage-discharge relation was affected by ice; good from July to September.

COOPERATION.—Gage-height record furnished by Okanogan Valley Power Co.

Discharge measurements of Similkameen River near Oroville, Wash., during the year ending Sept. 30, 1918.

[Made by L. D. Carson.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Feb. 7	[a] 2.53	912
Apr. 7	2.19	826
8	2.27	904
June 22	10.53	8,670

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Similkameen River near Oroville, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	435	453	758	3,870		709	809	7,220	9,300	4,540	1,320	662
2	453	453	758	5,050		709	862	8,260	8,390	4,340	1,260	617
3	417	453	662	4,240		709	862	9,440	7,740	4,140	1,320	662
4	417	472	662	3,330		709	809	11,000	7,480	3,690	1,260	617
5	531	573	662	2,910	880	662	809	11,800	7,740	3,420	1,140	573
6	531	662	662	2,590		617	862	10,700	8,650	3,240	1,080	531
7	491	617	617	2,350		662	862	10,100	9,580	2,990	1,020	511
8	472	662	573	2,270		662	915	9,040	11,900	2,910	970	491
9	453	617	573	2,130	915	662	970	8,390	13,100	2,750	915	491
10	453	573		1,710	862	617	1,020	7,870	14,300	2,910	915	491
11	435	573		1,320	915	617	1,260	7,870	16,400	3,600	915	453
12	453	573			915	662	1,580	8,520	16,400	2,990	970	417
13	417	573	510		862	617	1,710	9,580	15,000	2,670	1,080	435
14	417	573		1,430	862	662	1,780	11,000	16,700	2,430	970	417
15	417	573			809	662	1,780	12,200	15,000	2,350	970	400
16	382	573			758	662	1,640	13,200	11,900	2,510	970	400
17	382	573	573	1,450	709	662	1,580	11,900	10,700	2,350	1,020	382
18	400	531	662	1,450	662	662	1,580	11,300	10,600	2,270	1,020	382
19	417	531	709	1,380	573	662	1,580	10,000	9,720	2,130	1,020	382
20	417	531	809			662	1,640	9,040	8,780	2,200	1,020	365
21	417	531	915	1,110		662	2,270	8,260	9,170	1,990	1,020	365
22	435	1,380	915			662	3,510	7,610	8,780	1,850	1,020	348
23	453	1,380	809			662	3,9 0	6,980	8,650	1,710	970	348
24	453	1,140			600	617	4,140	6,500	8,260	1,640	915	348
25	453	970		1,200		617	4,540	6,040	7,350	1,580	915	400
26	453	915	640	1,140		662	4,340	5,600	6,740	1,580	862	417
27	453	862		1,080		662	4,140	5,380	6,260	1,710	809	382
28	453	809		1,020		662	4,440	5,380	5,710	1,780	758	365
29	435	809	709		.....	662	4,940	6,040	5,380	1,640	709	365
30	435	758	1,640	800	.....	662	6,040	7,870	4,740	1,450	709	348
31	453	.....	4,340		.....	709	.....	10,000	.....	1,380	709	.....

NOTE.—Braced figures show mean discharge for periods indicated when stage-discharge relation was affected by ice.

Monthly discharge of Similkameen River near Oroville, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	531	382	441	27,100
November	1,380	453	690	41,100
December	4,340	.....	799	49,100
January	5,050	.....	1,790	110,000
February	.....	.....	746	41,400
March	709	617	661	40,600
April	6,040	809	2,240	133,000
May	13,200	5,380	8,840	544,000
June	16,700	4,740	10,000	595,000
July	4,540	1,380	2,540	156,000
August	1,320	709	986	60,600
September	662	348	446	26,500
The year	16,700	348	2,540	1,820,000

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SALMON CREEK NEAR CONCONULLY, WASH.

LOCATION.—In sec. 18, T. 35 N., R. 25 E., half a mile below Conconully reservoir, Okanogan project of United States Reclamation Service, 2 miles south of Conconully and 14 miles above Okanogan, Okanogan County.

DRAINAGE AREA.—121 square miles; 164 square miles (revised measurement) at Jones ranch (measured on topographic maps).

RECORDS AVAILABLE.—July 6, 1910, to September 30, 1918. From April 12, 1903, to March 31, 1912, records were obtained at Jones ranch in sec. 31, T. 34 N., R. 26 E., about 3 miles above Okanogan.

GAGE.—Vertical staff half a mile below reservoir indicates head on weir; read by Allen Honey.

DISCHARGE MEASUREMENTS.—Made from footbridge near gage.

CHANNEL AND CONTROL.—20-foot recatangular sharp-crested weir with two end contractions; prior to October 1, 1912, a 20-foot Cippoletti weir.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.58 feet from 8.45 p. m. June 12 to 11 p. m. June 13 (discharge, 143 second-feet); minimum stage recorded, 0.06 foot on numerous days during October to December (discharge, 1.3 second-feet).

1903–1918: Maximum stage recorded, 3.63 feet April 29, 1904 (discharge, 577 second-feet). No flow 4 p. m. October 3 to 6 p. m. October 11, 1910, when water was being stored in Salmon Lake and Conconully reservoirs.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—Flow controlled by storage in Salmon Lake reservoir (capacity, 2,600 acre-feet) and Conconully reservoir (capacity, 13,000 acre-feet). Monthly summaries of flow for 1912–1918 have been corrected for storage.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths once daily and oftener when head was changed. Daily discharge ascertained by applying daily gage height to rating table or, for days when head was changed, by taking weighted mean of results obtained by applying to rating table gage heights for various periods of constant head. Records excellent.

COOPERATION.—Gage-height record and storage determinations furnished by United States Reclamation Service.

Two independent discharge measurements were made on June 16 by L. D. Carson. During both measurements the gage height was 1.53 feet and discharge, 138 second-feet.

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Daily discharge, in second-feet, of Salmon Creek near Conconully, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.5	1.3	1.5	1.5	1.7	1.7	1.9	2.8	14	12	7.9	22
2	1.5	1.3	1.5	1.5	1.7	1.7	1.9	4.2	14	16	6.3	22
3	1.5	1.3	1.5	1.5	1.7	1.7	1.9	18	14	14	5.4	22
4	1.5	1.3	1.5	1.5	1.7	1.7	1.9	19	14	15	7.0	23
5	1.5	1.3	1.5	1.5	1.7	1.7	1.9	25	17	15	11	18
6	1.5	1.3	1.3	1.5	1.7	1.7	1.9	30	23	15	6.1	19
7	1.5	1.3	1.3	1.5	1.7	1.7	1.9	41	26	20	10.0	20
8	1.5	1.3	1.3	1.5	1.7	1.7	1.9	51	32	25	10.5	21
9	1.5	1.3	1.3	1.5	1.7	1.7	1.9	63	53	26	10.5	18
10	1.5	1.3	1.3	1.5	1.7	1.7	1.9	72	80	28	10.5	13
11	1.5	1.3	1.3	1.5	1.7	1.7	1.9	73	126	28	15	15
12	1.3	1.3	1.3	1.5	1.7	1.7	1.9	78	140	27	17	15
13	1.3	1.3	1.3	1.5	1.7	1.7	1.9	108	143	25	26	15
14	15	2.8	1.3	1.5	1.7	1.7	1.9	113	140	25	30	16
15	53	4.0	1.3	1.5	1.7	1.9	2.8	115	139	24	33	16
16	56	4.0	1.7	1.5	1.7	1.9	5.1	114	135	23	28	16
17	15	4.0	1.7	1.7	1.7	1.9	4.0	110	124	22	28	6.3
18	1.5	4.0	1.7	1.7	1.7	1.9	4.0	95	110	13	26	8.6
19	1.3	4.0	1.7	1.7	1.7	1.9	4.0	2.5	82	13	28	12
20	1.3	4.0	1.5	1.7	1.7	1.9	4.0	11	25	27	22	17
21	1.3	4.0	1.5	1.7	1.7	1.9	4.0	18	28	74	32	10.3
22	1.3	4.0	1.5	1.7	1.7	2.1	4.0	18	27	115	32	8.9
23	1.3	4.0	1.5	1.7	1.7	2.1	4.0	20	20	132	30	16
24	1.3	4.0	1.5	1.7	1.7	2.1	4.0	20	20	54	26	15
25	1.3	4.0	1.5	1.7	1.7	2.1	4.0	20	16	47	26	15
26	1.3	2.1	1.5	1.7	1.7	2.1	4.0	20	15	26	24	15
27	1.3	1.5	1.7	1.7	1.7	2.1	4.0	18	12	23	23	15
28	1.3	1.5	1.7	1.7	1.7	2.1	4.0	10.3	15	22	23	15
29	1.3	1.5	1.7	1.7	.....	1.9	4.0	14	16	19	22	16
30	1.3	1.5	1.7	1.7	.....	1.9	4.0	14	13	19	23	16
31	1.3	.....	1.7	1.7	.....	1.9	.....	14	.....	17	22	.....

Monthly discharge of Salmon Creek near Conconully, Wash., for the year ending Sept. 30, 1918.

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Mean discharge without storage, in second-feet.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	
October	56	1.3	5.69	350	+ 226	576	9.37
November	4.0	1.3	2.39	142	+ 476	618	10.4
December	1.7	1.3	1.49	91.6	+ 617	709	11.5
January	1.7	1.5	1.60	98.4	+ 544	642	10.4
February	1.7	1.7	1.70	94.4	+ 376	470	8.46
March	2.1	1.7	1.85	114	+ 515	629	10.2
April	5.1	1.9	3.02	180	+ 906	1,090	18.3
May	115	2.5	42.8	2,630	− 504	2,130	34.6
June	143	12	54.4	3,240	−2,040	1,200	20.2
July	132	12	31.0	1,910	−1,640	270	4.39
August	33	5.4	20.0	1,230	−1,070	160	2.60
September	23	6.3	15.9	946	− 580	366	6.15
The year	143	1.3	15.2	11,000	−2,170	8,860	12.2

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METHOW RIVER BASIN.

METHOW RIVER AT PATEROS, WASH.

LOCATION.—In sec. 2, T. 29 N., R. 23 E., three-fourths mile above highway bridge at Pateros, Okanogan County, and 1 mile above mouth.

DRAINAGE AREA.—1,850 square miles (measured on topographic and Forest service maps).

RECORDS AVAILABLE.—June 17, 1903, to September 30, 1918. (Records, June 17, 1903, to September 30, 1914, are revised and presented in this paper.)

GAGE.—Inclined and vertical staff gage on left bank three-fourths mile above highway bridge; read by F. W. Robinson, Sarah E. Pasley, Walter Young, and Ella R. Yowell.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet upstream or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of large boulders and gravel; shifts at extremely high stages. No well-defined control. One channel at all stages. Right bank high and not subject to overflow; left bank not subject to overflow below gage height 12 feet. Stage of zero flow, according to measurements made October 1, 1918, gage height 1.3 feet ±0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.98 feet at 8.30 a. m. June 14 (discharge, 9,510 second-feet); minimum stage probably occurred during period in which stage-discharge relation was affected by ice.

1903–1918: Maximum stage recorded, 11.6 feet, May 11, 1910 (discharge, 14,900 second-feet). Minimum flow estimated at 230 second-feet January 3 and 4, 1912, when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation seriously affected by ice; flow estimated from discharge measurements, observer's notes, and weather records.

DIVERSIONS.—Many small ditches divert water for irrigation above station.

REGULATION.—None.

ACCURACY.—(1918) stage-discharge relation changed at high water June 13; affected by ice as indicated in footnote to table of daily discharge. Rating curves well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records excellent, others fair.

Discharge measurements of Methow River at Pateros, Wash., during the years ending Sept. 30, 1914, 1915, and 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1913-14.		*Feet.*	*Sec.-ft.*	1918.		*Feet.*	*Sec.-ft.*
June 28	C. O. Brown	7.18	[a] 3,880	Feb. 5	L. D. Carson	4.30	580
28	do	7.15	[a] 3,790	11	do	4.16	482
Aug. 18	do	4.31	[a] 519	Apr. 4	do	4.50	696
				4	do	4.50	705
1914-15.				Apr. 12	do	5.24	1,280
Jan. 30	J. T. Hartson	[b] 4.68	513	12	do	5.28	1,320
Feb. 2	do	[b] 4.46	493	June 18	do	8.15	5,660
June 2	do	6.98	[a] 3,500	19	do	7.85	4,900
3	do	6.85	[a] 3,420				
Aug. 11	C. O. Brown	4.48	651				

[a] Corrected since previous publication on account of arrangement o' meter and weight or weights.
[b] Stage-discharge relation affected by ice.

NOTE.—Measurements made during 1913–14 listed here are only those which have been revised; others will be found in Water-Supply Paper 392.

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Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1903.					1903.				
1	.....	6,410	1,690	890	16	.....	2,940	1,150	820
2	.....	6,000	1,570	820	17	13,200	2,790	1,060	750
3	.....	5,600	1,460	750	18	11,800	2,790	1,100	820
4	.....	5,020	1,350	750	19	12,100	2,490	930	820
5	.....	4,830	1,350	718	20	11,200	2,070	855	820
6	.....	4,280	1,350	750	21	11,400	2,070	890	820
7	.....	4,100	1,350	750	22	10,700	2,070	930	970
8	.....	3,920	1,350	750	23	10,100	2,070	890	1,060
9	.....	3,750	1,320	685	24	8,980	1,940	890	1,060
10	.....	3,580	1,300	685	25	8,980	1,940	970	1,060
11	.....	3,410	1,280	750	26	8,760	1,940	970	1,060
12	.....	3,410	1,250	820	27	8,540	1,810	970	1,060
13	.....	3,250	1,220	820	28	8,320	1,810	890	970
14	.....	3,250	1,200	820	29	7,460	1,810	890	970
15	.....	2,790	1,180	820	30	7,040	1,810	820	970
					31	.....	1,690	820	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1903–4.												
1	890	1,060	890	685	520	520	475	7,460	8,100	7,280	1,270	625
2	890	1,060	930	655	545	520	475	7,040	7,880	7,510	1,270	625
3	820	1,060	970	625	598	498	498	6,410	7,880	6,590	1,170	570
4	890	1,0 0	890	625	625	498	498	6,200	7,880	6,590	1,170	570
5	890	1,060	785	625	625	498	520	6,000	8,100	6,360	1,170	570
6	890	1,150	820	625	625	498	545	5,400	8,540	6,360	1,070	570
7	820	1,150	890	655	625	498	570	5,020	8,760	6,590	1,070	570
8	890	1,150	890	656	598	498	598	4,020	7,880	5,920	980	570
9	890	1,150	890	655	570	498	625	4,640	7,040	5,260	980	520
10	820	1,060	890	625	570	498	718	4,640	7,040	4,830	980	520
11	890	1,100	890	625	598	498	890	4,640	6,410	4,620	820	520
12	970	1,020	890	625	655	498	1,350	4,640	6,410	4,410	820	520
13	970	970	890	625	625	475	2,350	4,640	6,410	3,800	820	520
14	970	1,020	855	625	685	475	3,580	5,210	6,410	3,220	820	475
15	970	970	855	655	685	475	5,800	5,210	5,800	2,860	750	475
16	1,060	930	820	655	655	475	6,830	5,400	5,800	2,520	750	475
17	1,060	890	820	655	625	475	6,410	5,600	5,800	2,360	750	475
18	1,060	890	820	655	625	475	6,000	6,000	9,420	2,200	750	475
19	1,150	890	785	625	598	475	6,200	6,410	9,410	2,050	685	475
20	1,150	890	785	520	598	475	6,200	7,670	8,690	2,050	685	475
21	1,150	930	785	520	598	475	6,410	9,200	7,280	2,050	685	475
22	1,150	890	785	520	570	475	6,200	9,640	6,590	1,900	685	475
23	1,150	855	785	598	570	475	6,200	11,800	4,200	1,900	685	475
24	1,150	820	750	570	570	475	5,800	10,700	5,260	1,900	625	475
25	1,150	820	718	570	545	475	5,600	8,540	4,830	1,760	570	475
26	1,060	820	718	570	545	475	5,400	7,880	5,700	1,630	570	475
27	1,060	785	718	570	545	475	6,200	7,460	6,590	1,630	570	475
28	1,060	785	718	570	545	475	8,100	7,880	7,280	1,630	570	475
29	1,060	785	685	570	520	475	9,640	8,760	7,280	1,500	685	435
30	1,060	820	685	520	.....	475	8,760	8,540	7,280	1,380	685	435
31	1,060	.....	685	520	.....	475	.....	8,100	.....	1,380	685	.....

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Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1904–5.												
1	435	455	475	455		435	1,380	3,410	8,690	5,260	1,380	545
2	435	455	475	455		435	1,270	3,410	10,400	5,260	1,320	520
3	435	455	475	455		455	1,270	3,410	10,900	5,260	1,320	520
4	435	455	475	455		455	1,270	3,040	11,900	5,040	1,270	498
5	435	455	475	455	350	498	1,270	3,040	10,900	4,830	1,270	498
6	435	455	475	455		520	1,270	3,040	10,900	4,200	1,170	475
7	435	455	475	455		520	1,380	3,040	10,900	4,000	1,120	475
8	435	455	475	435		520	1,380	3,600	10,900	3,800	1,070	475
9	435	455	475	415		570	1,440	5,920	11,600	3,600	980	498
10	625	455	475	395		980	1,440	5,700	11,400	3,600	938	498
11	625	455	475	395		1,380	1,440	5,040	10,900	3,220	895	475
12	570	455	475	395		1,380	1,560	4,830	10,400	2,860	858	475
13	520	455	475	395		1,380	1,630	4,410	10,200	2,690	858	475
14	520	455	498	395	320	1,320	1,630	4,410	7,740	2,520	820	475
15	520	455	498	395		1,270	1,630	4,200	7,050	2,520	785	475
16	498	475	475	395		1,270	1,760	4,000	6,820	2,200	785	475
17	498	475	475	395		1,380	1,900	4,000	6,360	2,200	785	475
18	498	498	455	435		1,630	1,900	4,000	5,920	2,050	750	475
19	498	475	435	475		1,760	1,900	4,000	6,140	1,900	718	475
20	498	475	415	475		1,900	2,050	4,000	6,140	1,900	685	475
21	475	498	415	435		1,900	2,200	4,000	6,140	1,900	625	475
22	475	520	415	435		1,760	2,690	3,800	6,140	1,900	625	475
23	475	520	415	435		1,630	3,600	3,800	6,140	1,900	598	475
24	455	520	395	435		1,630	4,410	3,600	7,050	1,900	598	475
25	455	520	360	435	340	1,630	5,920	3,600	6,590	1,630	598	498
26	455	520	345	435	415	1,560	6,140	3,410	6,360	1,630	598	520
27	455	498	415	415	435	1,500	5,700	4,000	6,140	1,760	570	570
28	455	498	435	415	435	1,500	5,260	4,410	5,920	1,630	570	570
29	455	475	455	395	.....	1,380	4,200	5,480	5,480	1,630	570	570
30	455	475	455	380	.....	1,380	4,000	6,140	5,260	1,560	570	570
31	455	.....	455	320	.....	1,380	.....	7,740	.....	1,500	545	.....
1905–6.												
1	570	718	475	360	360	360	655	4,830	6,820	2,860	758	486
2	598	718	475	360	360	360	655	5,040	6,820	3,040	725	486
3	598	718	498	360	360	378	655	5,700	6,820	3,220	695	463
4	980	685	498	435	360	378	718	5,260	9,650	3,410	695	463
5	598	655	498	435	360	378	820	4,410	7,280	3,600	695	442
6	598	655	520	435	360	378	1,170	4,000	6,590	3,600	695	442
7	598	655	498	435	330	378	1,760	4,009	5,760	4,000	638	442
8	685	625	475	378	330	378	1,900	4,000	5,040	3,220	638	442
9	785	625	475	378	330	395	1,630	4,200	4,000	2,860	638	442
10	895	625	475	378	330	395	1,500	4,410	4,620	2,520	638	463
11	895	625	475	378	360	395	1,380	5,700	4,620	2,520	610	463
12	858	625	455	395	395	360	1,270	5,700	6,820	2,210	610	463
13	820	625	455	455	395	360	1,170	5,709	6,140	2,210	610	463
14	785	598	455	598	378	360	1,170	4,209	5,260	1,920	610	463
15	750	570	455	485	378	378	1,270	4,620	4,410	1,790	610	463
16	750	625	455	435	378	378	1,500	4,000	4,830	1,660	610	463
17	750	625	435	435	378	378	1,500	3,800	4,200	1,540	584	463
18	750	625	435	435	395	378	1,630	3,410	3,600	1,430	558	463
19	750	625	435	435	395	378	1,760	3,220	3,600	1,380	534	463
20	718	598	435	435	415	378	1,760	3,220	3,410	1,270	534	463
21	685	570	435	435	395	378	2,360	3,220	3,410	1,220	509	442
22	625	570	435	435	378	378	3,600	3,220	3,220	1,170	534	442
23	625	598	435	475	378	378	4,000	3,220	3,220	1,080	534	442
24	625	598	435	498	378	395	3,600	3,600	3,220	1,080	534	442
25	625	598	435	455	378	415	3,040	3,600	3,600	988	534	442
26	625	598	435	455	378	415	2,690	12,200	4,410	945	534	442
27	685	570	435	455	360	435	2,690	12,200	4,830	905	509	442
28	785	520	435	435	378	455	2,860	8,980	4,830	865	509	442
29	785	498	435	395	.....	455	2,860	8,450	4,000	865	486	420
30	750	475	395	360	.....	498	4,000	7,740	3,220	828	486	420
31	750	.....	395	360	.....	625	.....	7,050	.....	790	486	.....

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Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1906–7.												
1	420	638	584	420		534	584	2,360	12,900	5,040	1,430	610
2	420	610	584	380		534	610	2,520	10,600	4,410	1,380	584
3	420	610	584			558	638	2,860	9,900	4,410	1,380	584
4	420	638	584			558	638	2,860	9,410	4,830	1,320	442
5	420	638	584		380	558	665	3,410	9,410	4,200	1,220	442
6	420	638	584	330		558	726	4,000	9,170	3,600	1,120	442
7	400	610	584			558	726	4,830	7,970	2,520	1,080	442
8	400	638	584			558		5,920	7,970	2,690	1,080	558
9	400	610	584			558		6,590	7,050	3,220	1,030	558
10	400	638	584			558		6,590	6,360	3,220	1,030	584
11	400	758	584			558	1,130	6,360	6,140	3,220	945	584
12	400	758	584			558		5,920	6,140	3,040	905	610
13	400	758	584			558		5,260	5,480	2,860	865	610
14	400	790	420			558		5,260	5,260	2,690	828	584
15	420	1,320	584			558		6,140	4,620	2,690	790	610
16	442	1,170	584	300	420	558	1,540	10,200	4,410	2,360	758	638
17	442	945	584			558	1,790	10,400	4,200	2,520	758	638
18	442	865	509			558	1,920	9,900	4,620	2,520	725	638
19	442	790	486			558	1,920	9,900	5,480	2,520	725	665
20	442	758	486			558	1,920	10,200	5,700	2,360	695	665
21	420	725	509			558	1,920	9,410	6,140	2,210	665	665
22	420	695	509			558	2,060	8,210	5,700	2,210	665	665
23	420	665	509			558	2,860	7,970	5,040	2,210	638	665
24	420	665	509			558	2,860	8,210	5,040	2,060	638	665
25	420	665	509		500	558	2,520	7,970	5,040	1,920	638	665
26	400	638	420	380		558	2,520	7,970	6,140	1,060	695	665
27	725	638	442			558	2,520	8,210	7,280	1,660	695	665
28	695	610	442		534	558	2,360	9,410	6,820	1,660	665	638
29	695	584	463		.....	558	2,210	10,400	6,140	1,540	665	638
30	665	584	486		.....	584	2,360	10,900	5,480	1,480	695	638
31	665	.....	486		.....	584	.....	12,600	.....	1,480	665	.....
1907–8.												
1	638	509	486	442	330	380	534	2,210	6,140	5,480	1,120	610
2	638	509	486	463	315	362	584	2,860	6,140	5,700	1,030	610
3	610	486	486	463	380	362	584	3,220	6,560	5,260	988	584
4	610	486	486	442	463	362	558	3,220	6,820	4,830	945	584
5	610	486	463	420	509	362	558	3,220	7,050	4,000	945	558
6	584	486	463	420	486	362	558	3,220	7,970	4,000	905	558
7	584	463	463	400	463	362	558	4,410	8,920	3,800	865	534
8	584	463	463	400	463	362	558	4,830	10,400	3,690	865	534
9	558	463	442	420	486	362	584	4,830	11,600	3,600	828	509
10	558	463	442	420	486	362	610	4,830	11,660	3,410	790	509
11	558	463	442	400	463	380	665	4,830	11,600	3,220	758	486
12	534	463	442	400	442	380	665	4,830	11,400	3,220	758	463
13	534	463	442	400	420	400	828	4,620	9,650	3,220	725	463
14	534	463	442	420	442	420	1,080	4,410	9,650	4,000	725	463
15	534	463	420	400	420	442	1,540	4,410	9,410	4,000	695	463
16	509	442	400	400	420	463	1,120	4,200	8,920	4,000	695	463
17	509	442	380	380	420	463	1,170	4,000	7,970	3,800	665	442
18	509	442	420	420	400	463	1,220	4,000	7,050	3,000	665	442
19	509	442	400	420	380	442	1,270	4,200	6,140	3,220	665	442
20	509	442	442	420	380	442	1,320	4,410	5,480	3,040	665	442
21	486	463	463	380	380	442	1,420	4,620	4,830	2,860	665	442
22	486	463	463	345	362	442	1,540	4,830	4,410	2,600	665	420
23	486	463	463	362	362	463	1,660	4,830	4,410	2,520	725	420
24	486	463	486	362	380	486	1,790	4,830	4,830	2,360	695	420
25	486	463	486	362	380	534	1,920	5,040	5,760	2,210	695	420
26	486	463	463	345	380	534	1,920	5,260	5,260	1,920	665	420
27	486	463	442	330	380	534	1,790	5,260	5,040	1,660	665	420
28	463	486	442	330	362	534	1,920	5,700	4,410	1,540	665	420
29	463	486	420	400	362	509	1,920	6,140	4,000	1,480	638	400
30	463	486	420	345	.....	509	1,920	6,360	4,000	1,270	638	400
31	463	.....	442	330	.....	534	.....	6,580	.....	1,220	638	.....

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Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1908–9.												
1	400	400	420	400		486	558	1,220	7,740	4,000	1,480	509
2	400	400	380	460		463	558	1,270	11,400	4,000	1,430	509
3	400	400	380	380		463	558	1,540	12,200	4,000	1,320	486
4	400	400	380	380		463	558	2,210	10,400	4,000	1,220	486
5	400	420	380			420	558	2,520	9,410	4,410	1,120	463
6	400	420	380			345	558	2,360	8,450	4,830	1,080	463
7	400	420	400		330	345	558	2,060	7,280	5,700	1,030	463
8	400	420	420			345	558	1,920	6,820	6,140	988	463
9	460	442	442			345	584	1,920	7,050	5,480	945	442
10	380	442	442			345	610	2,210	7,970	5,260	905	442
11	380	420	442	280		345	665	2,060	9,170	4,830	865	442
12	380	420	442			345	725	2,060	9,900	4,000	790	420
13	380	420	442			345	790	2,210	9,170	3,600	758	420
14	380	400	420			345	865	2,520	8,210	3,220	758	420
15	380	420	400			362	945	2,690	8,690	3,040	725	400
16	380	420	420			362	945	2,860	8,980	2,860	695	400
17	380	420	400			362	905	2,860	8,450	2,860	665	400
18	380	442	380			380	905	2,860	7,970	2,690	638	380
19	280	442	345		330	380	905	2,860	7,970	2,520	610	400
20	400	509	362			380	945	2,860	7,510	2,210	584	400
21	400	509	380			380	945	2,860	7,050	2,210	584	400
22	400	534	400			380	988	2,860	6,820	1,920	584	400
23	400	509	420			380	1,030	2,860	5,920	1,920	558	400
24	380	509	400			380	1,120	3,410	5,260	1,920	558	400
25	380	486	400	330	330	400	1,220	4,200	4,830	1,920	558	400
26	400	463	400		362	420	1,320	6,140	4,620	1,790	558	400
27	400	463	400		380	442	1,380	7,280	4,620	1,660	558	420
28	400	463	420		380	486	1,380	7,740	4,200	1,660	558	442
29	400	463	420		.....	558	1,270	6,590	3,800	1,660	558	442
30	400	442	400		.....	558	1,220	5,920	3,800	1,540	534	463
31	400	.....	420		.....	558	.....	5,920	.....	1,540	534	.....
1909–10.												
1	463	420	945			584	2,210	7,050	7,740	4,200	1,320	558
2	463	442	828			665	2,210	6,590	7,050	4,200	1,320	558
3	463	486	610			638	2,210	6,360	6,820	4,200	1,220	584
4	463	509	558			558	2,210	6,360	6,360	4,000	1,170	558
5	442	486	584	350	340	486	2,060	6,590	6,590	4,000	1,120	558
6	442	463	610			486	2,210	7,510	6,820	4,000	1,120	534
7	442	463	610			463	2,210	9,410	6,820	4,000	1,220	534
8	442	463	638			463	2,210	11,400	6,360	4,200	1,170	558
9	442	463	610			442	2,210	11,900	6,590	4,200	1,170	558
10	420	463	610			442	2,360	12,900	7,050	4,200	1,220	534
11	420	463	610			442	2,520	14,900	7,740	4,410	1,120	509
12	420	463	584			420	2,520	12,200	8,690	4,200	1,030	509
13	420	442	558			463	2,690	10,600	9,410	4,009	988	509
14	420	420	534			509	2,860	9,410	9,170	3,800	945	509
15	420	420	509	370	360	558	2,690	8,450	8,450	3,220	905	486
16	420	420	534			638	2,690	7,740	7,970	3,220	865	486
17	420	420	509			790	2,860	7,970	7,050	3,220	790	509
18	420	420	509			988	3,220	8,930	6,590	2,860	758	534
19	420	442	509			1,170	4,000	8,930	6,140	2,690	725	509
20	420	463	442			1,920	5,260	8,450	5,700	2,520	695	509
21	420	463	400			2,690	5,700	8,210	5,480	2,210	695	509
22	420	463	380			3,040	5,700	10,900	5,260	2,360	665	509
23	420	509				3,220	5,700	11,400	4,830	2,210	638	509
24	420	558				3,220	7,050	12,200	4,410	2,060	638	509
25	420	584			390	3,220	9,410	12,600	4,000	1,920	610	509
26	420	558	370	360		2,860	12,200	10,900	4,410	1,920	584	509
27	400	509				2,860	11,900	9,410	4,620	1,660	584	486
28	400	584				2,690	9,900	7,970	4,410	1,660	584	486
29	420	558			.....	2,520	8,930	7,050	4,410	1,540	584	486
30	420	790			.....	2,360	7,740	6,820	4,000	1,430	558	486
31	420	.....			.....	2,360	.....	6,820	.....	1,380	534	.....

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d-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
	865	584	420			1,380	2,690	8,930	3,940	1,020	448
	828	584	380			1,430	3,040	10,900	3,770	1,020	448
	828	610	400		450	1,430	3,220	9,900	3,600	1,020	448
	790	584	420			1,380	3,410	8,450	3,280	1,020	501
	758	558	442			1,320	3,600	7,050	3,120	1,020	660
	758	558	610	360	558	1,320	3,600	6,590	3,280	980	770
	790	584	584		509	1,220	3,410	6,590	3,120	1,120	732
	828	584	584		486	1,120	3,410	6,590	2,970	1,020	732
	790	558	509		463	1,120	3,220	6,590	2,680	1,020	732
	758	558	509		442	1,170	2,860	6,590	2,400	935	770
	758	534	420		420	1,120	2,690	8,450	2,270	850	732
	725	534	362		400	1,080	2,690	11,900	2,270	770	732
	695	534	362		380	1,030	2,690	13,200	2,140	732	732
	695	534	315		380	1,630	2,860	11,200	2,140	732	770
	695	509		450	380	1,030	2,860	10,100	2,270	695	770
	665	509			380	1,080	3,800	9,420	2,270	660	810
	638	509			400	1,030	4,620	8,100	2,140	625	770
	638	486			420	1,080	4,620	7,040	2,140	592	732
	638	509	340		442	1,080	4,410	6,000	2,010	560	732
	665	509			463	1,080	4,200	5,400	1,890	560	695
	725	486			486	1,120	4,200	5,020	1,770	560	660
	725	486			558	1,220	4,620	5,400	1,650	560	625
	758	486			638	1,320	4,620	6,000	1,540	560	625
	665	486			828	1,660	4,200	5,600	1,430	560	592
	610	463		380	945	2,210	3,800	5,020	1,380	530	592
	509	420	340		945	2,520	3,600	5,020	1,380	501	592
	558	442			945	2,520	3,410	5,020	1,320	501	592
	610	463			905	2,360	3,410	4,830	1,220	474	560
	584	486		.....	905	2,360	3,410	4,470	1,120	474	530
	584	486		.....	988	2,520	4,200	4,110	1,070	448	530
	.....	463		.....	1,170	.....	6,140	.....	1,020	448	.....
1911–12.											
1	530	401	381		294	401	1,540	5,020	2,540	770	560
2	530	401	401		294	448	1,430	4,830	2,540	770	560
3	501	381	381		294	501	1,430	4,650	2,540	732	560
4	501	381	381		294	530	1,430	4,650	2,400	732	530
5	501	401	361		294	530	1,430	5,020	2,270	695	560
6	501	401	381	250	310	501	1,540	5,400	2,270	695	560
7	474	401	361	310	310	501	1,770	5,800	2,140	660	592
8	474	401	361		310	530	2,400	6,620	2,140	625	625
9	448	401	361		310	560	3,280	6,620	2,010	625	625
10	448	401	344		294	660	3,770	6,200	1,890	625	625
11	448	294	326		294	935	3,600	6,000	1,770	592	592
12	448	326	326		310	1,120	3,600	6,200	1,650	560	560
13	424	401	344	310	310	1,120	4,290	6,200	1,650	560	560
14	424	424	361	310	310	1,120	5,400	5,800	1,650	530	560
15	424	448	361	310	310	1,120	6,620	6,620	1,540	560	530
16	424	424	361	330	310	1,120	7,460	6,000	1,540	810	530
17	424	448	361		326	1,120	6,410	3,940	1,430	935	530
18	424	424	344		326	1,170	5,800	4,110	1,320	935	530
19	424	424	361		310	1,220	5,800	4,650	1,320	892	501
20	424	448	344		310	1,170	7,250	5,020	1,220	810	501
21	401	424	294		310	1,170	10,100	5,600	1,220	732	474
22	401	401	326		310	1,170	8,320	5,020	1,120	695	474
23	401	401	344		310	1,170	6,830	4,290	1,120	695	474
24	401	381	294		310	1,170	6,620	4,290	1,120	660	474
25	401	401	280		310	1,170	6,200	4,290	1,120	625	448
26	401	401		370	310	1,220	6,200	4,110	1,120	625	448
27	401	381			294	1,220	6,000	3,940	1,020	592	448
28	401	326	290		294	1,270	5,800	3,280	935	560	448
29	401	344			294	1,320	5,400	2,680	892	530	448
30	401	401			.....	401	1,540	5,400	2,400	892	530	424
31	401	.....			.....	401	.....	5,020	.....	770	560	.....

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Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	424	424	401				361	1,650	9,640	4,650	1,170	448
2	424	424	401	350			361	1,540	10,700	4,290	1,120	448
3	424	424	381				361	1,430	11,000	3,770	1,120	448
4	424	424	401			390	361	1,430	10,700	3,280	1,120	448
5	424	424	381	280	300		401	1,380	9,420	3,120	1,070	695
6	401	401	381				401	1,430	8,760	3,280	1,070	810
7	401	424	361			344	401	1,540	8,320	3,280	1,020	732
8	401	448	381	290		344	401	1,890	8,320	3,280	980	660
9	401	448	381			344	401	3,600	8,980	2,970	935	625
10	401	448	361			326	401	4,830	9,640	2,820	892	592
11	401	448	344			326	448	4,830	8,980	2,820	850	560
12	401	448	381			326	474	4,470	8,540	2,680	770	560
13	401	424	381			326	560	4,290	8,540	2,540	770	530
14	401	424	381			326	660	4,110	8,100	2,400	770	530
15	401	424	361			326	892	3,940	7,670	2,140	770	501
16	401	424	381	260	320	344	1,170	3,600	7,250	2,010	732	501
17	401	424	381			344	1,220	3,440	6,620	1,890	695	474
18	401	424	401			361	1,270	3,280	5,800	1,890	695	448
19	448	424	381			361	1,430	3,280	6,000	1,890	695	448
20	448	424	310			344	2,010	3,280	6,620	2,010	660	448
21	448	424	310			326	2,140	3,280	6,000	2,140	625	448
22	448	401				344	2,140	3,770	5,600	2,270	592	448
23	448	401				361	2,010	4,830	5,400	2,270	560	448
24	448	401				344	1,890	5,800	5,020	2,140	560	424
25	448	401			360	326	1,890	6,620	5,020	2,010	530	424
26	474	401	340	340		344	1,890	7,040	5,020	1,890	530	424
27	448	401				344	1,890	7,880	5,210	1,650	501	424
28	448	401				344	1,770	8,100	5,210	1,540	501	401
29	448	401			.....	344	1,650	8,320	5,020	1,430	474	401
30	424	401			.....	344	1,650	8,100	5,020	1,320	474	401
31	424	.....			.....	361	.....	8,980	.....	1,220	448	.....
1913–14.												
1	401	448	448	361	381	326	625	2,970	7,040	4,650	850	401
2	401	448	424	361	381	326	660	4,290	8,320	4,830	810	381
3	401	424	401	381	310	326	660	6,000	9,860	5,210	770	381
4	401	424	381	361		326	695	5,600	8,320	4,650	732	381
5	401	448	381	361		326	810	5,020	7,040	3,940	695	361
6	381	448	381	361		326	980	4,650	6,200	3,600	695	361
7	424	448	381	381		326	1,380	4,650	5,400	3,280	695	381
8	401	448	361	381	320	326	1,650	4,290	4,830	2,970	660	424
9	401	424	344	361		326	2,010	4,290	4,290	2,820	625	448
10	401	424	294	344		326	2,140	4,290	4,110	2,680	625	448
11	401	424	344	381		326	2,400	4,470	3,940	2,680	592	448
12	401	424	381	361		326	2,820	4,650	4,290	2,680	560	448
13	424	401	381	361		326	2,970	5,020	5,020	2,820	560	448
14	424	401	361	361	560	344	3,120	6,620	5,800	2,680	530	448
15	424	401	361	361	530	344	3,280	8,540	6,830	2,540	501	448
16	424	401	361	381	501	361	3,120	8,980	7,670	2,270	501	448
17	424	424	361	381	501	381	2,970	8,760	8,320	2,140	501	474
18	448	424	361	361	474	381	2,970	8,390	7,880	2,140	501	501
19	424	424	361	361	448	401	2,970	7,880	7,040	2,010	501	501
20	448	401	294	361	448	401	3,440	7,460	6,410	1,890	501	560
21	448	381	326	344	474	448	3,280	7,670	5,400	1,770	501	560
22	448	401	381	361	401	474	3,120	7,880	4,650	1,540	474	530
23	448	381	361	310	344	530	2,970	8,320	3,940	1,430	474	530
24	448	381	361	252	326	560	2,970	8,980	3,940	1,430	448	501
25	448	401	361	361	326	560	2,820	8,540	4,110	1,320	448	530
26	448	401	361	326	326	560	2,820	7,250	3,940	1,220	448	560
27	448	424	361	326	326	560	2,970	6,200	3,940	1,220	448	660
28	448	424	361		326	592	2,820	5,600	3,940	1,120	448	770
29	448	424	344	320	.....	592	2,680	5,020	3,940	1,020	424	732
30	448	448	344		.....	625	2,820	5,020	4,290	1,020	424	695
31	448	.....	361	401	.....	625	.....	5,800	.....	850	401	.....

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Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917–18.												
1	413	413	430	735			586	4,640	4,830	2,300	768	386
2	396	413	430	920			671	5,020	4,640	2,300	768	348
3	396	413	430	920	330	380	642	6,200	3,750	2,170	768	386
4	413	430	430	960			671	6,620	3,580	2,040	768	348
5	413	430	413	920	559		671	6,410	3,580	1,920	768	329
6	413	430	413	880	559	396	735	5,600	4,280	1,800	698	312
7	413	430	396	842	535	413	805	5,020	4,640	1,800	635	312
8	396	430	396	735	511	413	880	4,460	5,600	1,680	605	312
9	396	430	396	671	490	413	920	3,920	7,250	1,680	578	295
10	396	430	396	671	468	413	1,000	3,750	8,760	1,800	550	312
11	396	413	430	671	490	413	1,140	3,580	9,200	1,920	550	295
12	396	430	430	671	490	430	1,290	3,580	9,420	1,800	550	295
13	396	430	430	642	490	430	1,440	4,460	9,420	1,800	578	295
14	396	430	430			430	1,440	5,600	9,070	1,680	550	295
15	381	430	430			413	1,340	6,410	6,710	1,570	578	295
16	381	430	430		400	413	1,290	6,000	5,690	1,570	578	295
17	396	413	430			413	1,240	5,600	5,290	1,570	578	295
18	396	413	535			430	1,140	5,400	5,290	1,570	578	295
19	396	413	511	480		430	1,190	4,830	5,100	1,460	578	295
20	396	413	468			430	1,190	4,100	5,100	1,460	578	312
21	396	413	413			430	2,000	3,580	4,720	1,460	550	295
22	396	413	449			449	2,510	3,250	4,720	1,350	524	295
23	413	413	396		280	468	2,650	2,650	4,910	1,020	524	295
24	413	430	338			468	2,790	2,650	4,910	970	498	312
25	396	430				490	2,940	2,790	4,170	928	498	312
26	396	413				490	2,650	2,650	3,650	928	498	312
27	396	413	340			511	2,650	2,510	3,320	1,020	474	312
28	396	430				511	2,790	2,510	3,010	970	450	295
29	396	413		320	.....	511	3,090	2,650	2,710	845	428	295
30	396	413	511		.....	511	3,920	3,750	2,430	768	406	280
31	396	.....	735		.....	535	.....	5,020	.....	768	406	.....

NOTE.—Records June 17, 1903, to Sept. 30, 1914, revised since previous publication. Discharge ascertained from rating curves as follows: June 17, 1903, to June 18, 1904, fairly well defined; June 19, 1904, to May 26, 1906, fairly well defined; May 27, 1906, to June 13, 1911, well defined; June 14, 1911, to Sept. 30, 1914, well defined. Braced figures show mean discharge for periods indicated when stage-discharge relation was affected by ice.

Monthly discharge of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1903.				
June 17–30	13,200	7,040	9,900	275,000
July	6,410	1,690	3,150	194,000
August	1,690	820	1,140	70,100
September	1,060	685	854	50,800
The period	.....	.....	.....	590,000
1903–4.				
October	1,150	820	1,000	61,600
November	1,150	785	961	57,200
December	970	685	816	50,200
January	685	520	606	37,200
February	685	520	595	34,200
March	520	475	485	29,800
April	9,640	475	3,980	237,000
May	11,800	4,640	6,830	420,000
June	9,420	4,200	7,000	430,000
July	7,510	1,380	3,610	222,000
August	1,270	570	832	51,200
September	625	435	509	30,300
The year	11,800	435	2,270	1,660,000

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Monthly discharge of Methow River at Pateros, Wash., for the years ending Sept. 30, 1905–1914 and 1918—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1904–5.				
October	625	435	479	29,500
November	530	455	476	28,300
December	498	345	451	27,700
January	475	380	421	25,900
February	435	.....	347	19,200
March	1,990	435	1,210	74,400
April	6,140	1,270	2,500	149,000
May	7,740	3,040	4,210	259,000
June	11,900	5,260	8,250	491,000
July	5,260	1,500	2,820	174,000
August	1,380	545	847	52,100
September	570	475	498	29,600
The year	11,900	.....	1,880	1,360,000
1905–6.				
October	980	570	719	44,200
November	718	475	614	36,500
December	530	395	454	27,900
January	598	360	424	26,100
February	415	330	370	20,500
March	625	360	398	24,500
April	4,060	655	1,920	114,000
May	12,200	3,220	5,250	323,000
June	9,650	3,220	4,940	294,000
July	4,900	790	1,970	121,000
August	758	486	592	36,400
September	486	420	453	27,000
The year	12,200	330	1,510	1,100,000
1906–7.				
October	725	400	461	28,300
November	1,220	584	722	43,000
December	584	420	528	32,500
January	.....	.....	343	21,100
February	.....	.....	430	23,900
March	584	534	558	34,300
April	2,860	584	1,560	92,800
May	12,600	2,360	7,190	442,000
June	12,900	4,200	6,720	400,000
July	5,040	1,480	2,760	170,000
August	1,430	638	882	54,200
September	665	442	602	35,800
The year	12,900	.....	1,900	1,380,000
1907–8.				
October	638	463	531	32,600
November	509	442	468	27,800
December	486	380	448	27,500
January	463	330	395	24,300
February	509	315	411	22,600
March	534	362	434	26,700
April	1,920	534	1,140	67,800
May	6,590	2,210	4,520	278,000
June	11,600	4,000	7,250	431,000
July	5,700	1,220	3,250	200,000
August	1,120	638	763	46,900
September	610	400	478	28,400
The year	11,600	315	1,670	1,210,000
1908–9.				
October	400	380	392	24,100
November	534	400	444	26,400
December	442	345	404	24,800
January	.....	.....	317	19,500
February	.....	.....	327	18,200
March	558	345	405	24,900
April	1,380	558	871	51,800
May	7,740	1,220	3,250	200,000
June	12,200	3,800	7,520	447,000
July	6,140	1,540	3,210	197,000
August	1,480	534	798	49,100
September	509	380	432	25,700
The year	12,200	.....	1,530	1,110,000

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Monthly discharge of Methow River at Pateros, Wash., for the years ending Sept. 30, 1905–1914 and 1918—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1909–10.				
October	463	400	428	26,300
November	790	420	485	28,900
December	945	.....	516	31,700
January	.....	.....	360	22,100
February	.....	.....	361	20,000
March	3,220	420	1,420	87,300
April	12,200	2,060	4,590	273,000
May	14,900	6,360	9,320	573,000
June	9,410	4,000	6,360	378,000
July	4,410	1,380	3,090	190,000
August	1,320	534	889	54,700
September	584	486	520	30,900
The year	14,900	.....	2,370	1,720,000
1910–11.				
October	1,120	486	827	50,800
November	865	509	704	41,900
December	610	420	519	31,900
January	610	.....	389	23,900
February	.....	.....	398	22,100
March	1,170	.....	583	35,800
April	2,520	1,030	1,440	85,700
May	6,140	2,690	3,660	225,000
June	13,200	4,110	7,320	436,000
July	3,940	1,020	2,210	136,000
August	1,120	448	728	44,800
September	810	448	654	38,900
The year	13,200	.....	1,620	1,170,000
1911–12.				
October	530	401	439	27,000
November	448	294	396	23,600
December	401	.....	328	20,200
January	.....	.....	318	19,600
February	.....	.....	309	17,800
March	401	294	318	19,600
April	1,540	401	960	57,100
May	10,100	1,430	4,780	294,000
June	6,620	2,400	4,980	296,000
July	2,540	770	1,590	97,800
August	935	530	675	41,500
September	625	424	526	31,300
The year	10,100	.....	1,300	946,000
1912–13.				
October	474	401	424	26,100
November	448	401	420	25,000
December	401	.....	363	22,300
January	.....	.....	305	18,800
February	.....	.....	324	18,000
March	.....	326	350	21,500
April	2,140	361	1,100	65,500
May	8,980	1,380	4,260	262,000
June	11,000	5,020	7,400	440,000
July	4,650	1,220	2,480	152,000
August	1,170	448	764	47,000
September	810	401	505	30,000
The year	11,000	.....	1,560	1,130,000
1913–14.				
October	448	381	425	26,100
November	448	381	419	24,900
December	448	294	364	22,400
January	381	252	353	21,700
February	560	310	378	21,000
March	625	326	419	25,800
April	3,440	625	2,360	140,000
May	8,980	2,970	6,230	383,000
June	9,860	3,940	5,690	339,000
July	5,210	850	2,470	152,000
August	850	401	559	34,400
September	770	361	492	29,300
The year	9,860	252	1,680	1,230,000

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Monthly discharge of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917–18.				
October	413	381	399	24,500
November	430	413	422	25,100
December	735	.....	426	26,200
January	960	.....	578	35,500
February	559	.....	383	21,300
March	535	.....	437	26,900
April	3,920	586	1,610	95,800
May	6,620	2,510	4,360	268,000
June	9,420	2,430	5,320	317,000
July	2,300	768	1,510	92,800
August	768	406	576	35,400
September	386	280	310	18,400
The year	9,420	.....	1,360	987,000

NOTE.—Open-water records prior to June, 1906, good; beginning that month, excellent. Records during periods prior to 1911 in which stage-discharge relation was affected by ice, poor; beginning 1911, fair.

CHELAN RIVER BASIN.

LAKE CHELAN AT CHELAN, WASH.

LOCATION.—In sec. 13, T. 27 N., R. 22 E., at Forest Service boat landing at Chelan, in Chelan County, a quarter of a mile above highway bridge at outlet.

DRAINAGE AREA.—950 square miles (measured on topographic and Forest Service maps).

RECORDS AVAILABLE.—September 1 to October 15, 1897; January 1, 1898, to December 31, 1899; January 1 to June 30, 1905; December 5, 1910, to September 30, 1918.

GAGE.—Vertical staff on pile at landing installed December 5, 1910; datum, 1,076.15 feet above sea level; read by W. E. Naylor. Gage used from 1897 to 1899 was at Lakeside, about a mile west of Chelan; datum 1,070.18 feet above sea level. In 1905 gage was on a bent of upper bridge at Chelan; elevation not determined.

EXTREMES OF STAGE.—Maximum stage recorded during year, 5.00 feet July 1; minimum stage recorded, 1.37 feet April 8.

1898–1899 and 1911–1918: Maximum stage recorded, 7.2 feet June 18, 1916; minimum stage recorded, 6.60 feet January 27–28 and December 2–5, 1898.

REGULATION.—Height of water in the lake controlled by operation of gates in dam at outlet.

ACCURACY.—Gage read to hundredths about once a week.

COOPERATION.—Gage-height record furnished by United States Forest Service.

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Daily gage height, in feet, of Lake Chelan at Chelan, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1										5.00		
2												
3					2.30							3.52
4			3.01			2.02						
5		2.90						3.72			3.50	
6				4.98								
7	3.44											
8							1.37			4.25		
9												3.50
10			2.98			1.95			4.93			
11		3.00			2.16						3.35	
12								3.74				
13				4.00								
14												
15	3.30						1.75			4.02		3.51
16			3.25									
17									5.20			
18					1.89	1.71						
19		2.87									3.25	
20								4.03				
21	3.10			3.18						3.90		
22							1.92					3.50
23												
24			3.67									
25		3.11			2.02	1.54					3.42	
26								3.53				
27				2.73								
28					1.98					3.50		
29	2.83											3.49
30							2.75					
31	2.85		4.53			1.60						

CHELAN RIVER AT CHELAN, WASH.

LOCATION.—In sec. 13, T. 27 N., R. 22 E., at lower highway bridge at Chelan, Chelan County, 800 feet below flashboard dam at outlet of Chelan Lake and 4 miles northwest of Chelan Falls.

DRAINAGE AREA.—950 square miles (measured on topographic and Forest Service maps).

RECORDS AVAILABLE.—November 1, 1903, to September 30, 1918. (Records prior to October 1, 1913, have been revised and published in this report).

GAGE.—Vertical staff on fourth bent of left approach to lower highway bridge; read by W. E. Naylor.

DISCHARGE MEASUREMENTS.—Made from upper highway bridge 1,000 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; shifting at extremely high water. No well-defined control. Banks high; not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.30 feet June 14 and 15 (discharge, 8,140 second-feet); minimum stage recorded, 3.99 feet March 9 (discharge, 330 second-feet).

1903-1918: Maximum stage recorded, 11.48 feet June 20, 1916 (discharge, 9,780 second-feet). Practically no flow for at least part of day on January 30, 1917; river frozen solid at dam so no water could flow over it.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Several irrigation ditches divert from tributaries a very small proportion of the run-off.

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Regulation.—Flashboard dam 800 feet above gage controls lake level at low water in interest of navigation. Monthly summaries of flow have been corrected for natural and artificial storage in Lake Chelan.

Accuracy.—Stage-discharge relation changed at high water on June 14, 1918. Rating curves well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

Cooperation.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Chelan River at Chelan, Wash., during the years ending Sept. 30, 1910, 1912–1915, and 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1909–10.				1914–15.			
May 14	McGlashan and Ebert	10.65	[a] 8,320	June 3	J. T. Hartson	7.33	[b] 3,050
1911–12.				1917–18.			
June 6	R. C. Pierce	9.08	[b] 5,660	Apr. 2	L. D. Carson	5.98	1,270
1912–13.				2	do	5.98	1,230
June 3	F. B. Storey	10.48	[b] 8,010	June 14	do	10.30	8,140
3	do	10.50	[b] 8,200	15	do	10.30	8,180
1913–14.				July 5	do	8.95	5,620
July 1	Brown and Muldrow	8.77	[b] 5,150				
2	C. O. Brown	8.84	[b] 5,300	Sept. 30	Lee and Calkins	5.60	981

[a] Discharge previously published corrected as error was made in original computations.
[b] Discharge previously published corrected on account of arrangement of meter and weight or weights.

Note.—Measurements made prior to 1918 and listed here are only those which have been revised; others will be found in previous water-supply papers.

Daily discharge, in second-feet, of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1913 and 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1903–4.											
1		1,440	1,060	900	900	1,060	5,580	7,600	7,430	4,460	900
2		1,680	1,060	900	900	1,060	5,580	7,770	7,600	4,300	765
3	1,940	1,560	1,060	900	830	1,060	5,580	7,770	7,770	4,300	765
4		1,560	975	900	830	1,060	5,420	7,770	7,940	4,300	765
5		1,560	830	830	830	1,060	5,420	7,940	7,940	4,140	765
6	1,940	1,560	900	555	830	1,060	5,260	8,110	8,110	3,980	1,680
7	1,940	1,560	900	765	830	1,060	4,940	8,280	7,940	3,980	1,680
8	1,940	1,440	900	765	900	1,060	4,940	8,280	8,110	3,980	1,680
9	1,940	1,440	975	1,060	900	1,060	4,940	8,110	7,940	3,820	1,680
10	1,940	1,330	975	1,060	900	1,060	4,940	7,940	8,280	3,820	1,810
11	1,940	1,230	900	1,060	900	1,060	4,780	7,770	7,940	3,670	1,680
12	1,810	1,060	900	1,060	900	1,330	4,620	7,600	8,110	3,670	1,680
13	1,810	1,140	900	975	900	1,560	4,620	7,430	7,940	3,520	1,680
14	1,680	1,140	975	975	900	2,070	4,620	7,260	7,600	3,370	1,680
15	1,680	1,230	900	900	900	2,350	4,620	7,260	7,260	3,220	1,680
16	1,680	1,230	900	900	1,140	2,770	4,780	7,430	6,920	3,220	1,680
17	1,680	1,230	900	900	1,060	3,220	4,940	7,430	6,580	3,070	1,680
18	1,680	1,140	1,060	900	1,440	3,370	4,940	7,770	6,240	3,070	1,440
19	1,560	1,140	975	900	1,440	3,670	5,260	7,940	5,900	3,070	1,440
20	1,560	1,140	900	900	1,440	3,820	5,420	7,940	5,740	2,920	1,440
21	1,560	1,140	900	900	1,440	4,140	5,580	7,940	5,420	2,770	1,440
22	1,560	1,140	900	975	1,440	4,300	6,070	7,940	5,260	2,770	1,330
23	1,560	1,140	900	830	1,330	4,300	6,580	7,600	5,260	2,630	1,330
24	1,440	1,230	900	830	1,140	4,300	6,920	7,260	5,260	2,490	1,230
25	1,440	1,230	975	900	1,140	4,300	7,090	7,260	4,940	2,490	1,230
26	1,440	1,230	975	900	1,140	4,460	7,260	7,090	4,300	2,350	1,230
27	1,440	1,230	900	975	1,140	4,620	7,260	6,920	4,140	1,680	900
28	1,440	1,140	900	900	1,060	4,780	7,260	6,920	4,620	1,230	900
29	1,440	1,140	900	900	1,060	5,260	7,260	7,090	4,620	765	900
30	1,440	1,060	900	.....	1,060	5,580	7,430	7,260	4,460	830	900
31	.....	1,060	900	.....	1,060	.....	7,600	.....	4,460	900	.....

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Daily discharge, in second-feet, of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1913 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1904–5.												
1	900	765	830	765	705	765	2,210	3,670	5,420	6,410	3,980	1,140
2	900	765	830	765	705	765	2,070	3,670	5,900	6,240	3,830	1,080
3	900	765	830	765	705	765	1,940	3,670	6,240	6,240	3,670	1,080
4	900	765	830	765	705	830	1,940	3,370	6,580	6,240	3,520	1,080
5	900	765	830	765	705	830	1,940	3,370	6,920	6,070	3,370	1,080
6	900	765	830	765	830	900	1,940	3,370	7,260	6,070	3,370	1,080
7	900	765	830	765	765	900	1,940	3,520	7,260	5,900	3,220	1,080
8	900	765	830	765	765	1,410	1,940	3,670	7,430	5,900	3,370	1,140
9	830	765	765	765	765	1,440	1,940	3,670	7,600	5,740	3,220	1,230
10	830	765	765	765	765	1,810	1,940	3,820	7,940	5,580	3,070	1,330
11	765	765	765	765	765	1,940	1,940	3,980	7,940	5,580	3,070	1,330
12	765	830	765	765	765	1,940	1,940	3,980	8,280	5,580	2,920	1,440
13	765	830	765	765	765	1,940	1,940	2,980	8,280	5,420	2,920	1,440
14	1,060	765	765	765	765	2,210	1,940	3,980	8,280	5,260	2,770	1,440
15	1,060	830	830	765	765	2,210	1,940	3,980	7,940	5,100	2,770	1,440
16	1,060	830	830	765	765	2,210	1,940	3,980	7,770	4,940	1,940	1,440
17	1,060	830	765	765	765	2,210	1,940	3,980	7,600	4,780	1,940	1,440
18	1,060	765	765	765	765	2,350	2,070	3,980	7,260	4,620	975	1,330
19	1,060	765	765	705	765	2,350	2,070	3,980	7,260	4,300	1,060	1,230
20	1,060	830	765	705	765	2,490	2,070	3,980	7,260	4,300	1,060	1,230
21	975	830	765	705	765	2,490	2,210	3,980	7,090	4,300	1,060	1,330
22	975	830	765	705	765	2,490	2,210	3,980	6,920	4,300	1,060	1,330
23	975	830	765	705	765	2,490	2,490	3,980	6,920	4,300	1,060	1,330
24	900	830	765	705	765	2,490	2,630	3,980	6,920	4,300	1,060	1,440
25	900	900	765	765	765	2,490	2,920	3,820	6,920	4,300	1,060	1,440
26	900	900	765	705	765	2,490	3,370	3,670	6,920	4,300	1,060	1,440
27	900	900	765	705	765	2,490	3,520	3,820	6,920	4,300	1,060	1,440
28	830	830	765	705	765	2,490	3,670	3,980	6,750	4,300	1,060	1,440
29	765	830	765	705	.....	2,350	3,670	3,980	6,580	4,300	1,060	1,440
30	765	830	765	705	.....	2,210	3,670	4,300	6,580	4,300	1,230	1,440
31	765	.....	765	705	.....	2,210	.....	4,940	.....	4,140	1,140	.....
1905–6.												
1	1,440	1,560	900	765	975	900	1,060	3,670	4,620	3,370	2,770	1,440
2	1,440	1,440	900	765	975	900	1,140	3,820	4,620	3,520	2,770	1,440
3	1,680	1,440	900	765	900	900	1,140	3,980	4,780	3,670	2,770	1,330
4	1,940	1,440	900	765	900	900	1,140	4,300	4,620	3,980	2,490	1,330
5	1,940	1,440	900	765	900	900	1,230	4,460	4,620	4,300	2,490	1,230
6	2,070	1,330	830	765	900	900	1,230	4,620	4,620	4,300	1,810	1,230
7	2,350	1,330	830	765	900	900	1,680	4,460	4,620	4,620	1,810	1,140
8	2,210	1,330	830	765	900	1,940	1,680	4,460	4,620	4,780	1,810	1,140
9	2,210	1,330	830	765	900	1,940	1,810	4,460	4,620	4,780	1,810	1,140
10	1,940	1,230	830	765	900	1,810	1,810	4,620	4,460	4,620	1,810	1,080
11	1,940	1,230	765	765	900	1,680	1,810	4,780	4,460	4,620	1,810	1,140
12	2,070	1,230	765	765	900	1,680	1,810	4,940	4,620	4,620	1,810	1,230
13	2,210	1,140	830	830	900	1,560	1,810	5,100	4,620	4,620	1,680	1,440
14	1,940	1,140	830	830	900	1,440	1,810	5,100	4,460	4,620	1,680	1,440
15	1,940	1,060	830	765	900	1,440	1,940	5,100	4,460	4,620	1,680	1,330
16	1,810	1,140	830	830	900	1,440	1,940	4,940	4,300	4,620	1,680	1,230
17	1,810	1,060	830	765	900	1,440	1,940	4,940	4,300	4,460	1,680	1,230
18	1,680	1,060	830	765	900	1,330	1,940	4,940	4,300	4,460	1,680	1,230
19	1,680	1,140	765	765	900	1,230	2,070	4,780	4,140	4,300	1,560	1,230
20	1,560	1,140	765	765	900	1,140	2,210	4,620	3,980	4,140	1,560	1,230
21	1,330	1,060	765	765	900	1,140	2,210	4,460	3,670	3,980	1,440	1,140
22	1,440	1,060	765	765	900	1,060	2,490	4,300	3,370	3,820	1,440	1,140
23	1,440	975	765	1,140	900	1,060	2,770	4,300	3,220	3,670	1,440	1,140
24	1,440	900	765	1,060	975	1,060	2,770	4,300	3,070	3,520	1,330	1,080
25	1,440	975	765	1,060	900	1,060	3,070	4,300	3,220	3,370	1,230	1,140
26	1,440	1,060	900	1,060	975	1,060	3,070	4,620	3,370	3,370	1,230	1,080
27	1,680	975	830	1,060	975	1,060	3,070	4,620	3,520	3,370	1,230	1,080
28	1,560	900	765	1,060	900	1,060	3,070	4,780	3,520	3,220	1,230	1,080
29	1,560	900	765	1,060	.....	975	3,220	4,780	3,520	3,220	1,330	1,080
30	1,680	900	765	975	.....	975	3,370	4,780	3,370	3,070	1,440	1,080
31	1,560	.....	765	975	.....	1,060	.....	4,780	.....	2,920	1,440	.....

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Daily discharge, in second-feet, of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1913 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1906–7.												
1	1,060	900	2,770	900	650	1,140	975	2,770	7,940	6,410	3,820	1,140
2	975	830	2,630	900	650	1,140	975	2,770	8,280	6,240	3,820	1,230
3	975	765	2,490	830	650	1,140	900	2,770	8,280	6,240	3,820	1,230
4	900	765	2,490	830	650	1,140	975	2,770	8,460	5,900	3,820	1,230
5	900	765	2,490	830	650	1,140	975	3,070	8,460	5,900	3,820	1,230
6	900	765	2,490	830	705	1,060	975	3,070	8,280	5,740	3,670	1,230
7	900	765	2,490	900	765	1,060	975	3,370	8,280	5,580	3,520	1,140
8	830	765	2,490	830	765	1,060	1,060	3,670	8,110	5,580	3,370	1,140
9	900	830	2,350	830	765	1,060	1,060	3,980	7,940	5,580	3,070	1,140
10	900	830	2,350	765	765	1,060	1,060	4,300	7,770	5,420	2,920	1,230
11	900	900	2,210	765	830	1,060	1,060	4,460	7,600	5,420	2,770	1,230
12	900	900	2,210	765	830	1,060	1,140	4,620	7,260	5,260	2,630	1,230
13	900	1,060	2,070	765	830	1,060	1,230	5,260	6,920	5,260	2,490	1,230
14	900	1,330	1,940	765	830	1,060	1,230	5,580	6,580	5,100	2,350	1,230
15	900	1,810	1,940	765	830	1,060	1,330	5,740	6,410	4,940	2,210	1,230
16	900	2,490	1,810	765	830	1,060	1,440	5,740	6,240	4,940	2,070	1,230
17	900	3,220	1,680	765	830	1,060	1,560	5,900	5,900	4,780	1,940	1,230
18	900	3,520	1,680	765	830	1,060	1,680	6,240	5,900	4,780	1,810	1,230
19	900	3,370	1,680	765	830	1,060	1,810	6,240	5,740	4,620	1,560	1,230
20	830	3,220	1,680	705	900	1,060	1,940	6,410	5,580	4,620	1,440	1,230
21	765	3,070	1,560	705	900	1,060	1,940	6,410	5,580	4,620	1,230	1,230
22	765	3,070	1,560	650	900	1,060	2,350	6,580	5,580	4,620	1,230	1,140
23	765	3,070	1,560	650	975	1,060	2,210	6,580	5,580	4,460	1,230	1,140
24	765	3,070	1,440	650	1,060	1,060	2,210	6,750	5,580	4,300	1,230	1,140
25	1,060	3,070	1,330	650	1,060	1,060	2,350	6,750	5,900	4,300	1,230	1,140
26	1,060	3,070	1,230	650	1,060	1,060	2,490	6,920	5,900	4,140	1,230	1,140
27	1,140	2,920	1,140	600	1,060	975	2,490	6,920	6,240	3,980	1,230	1,140
28	1,060	2,770	1,140	600	1,140	975	2,490	7,260	6,240	3,980	1,140	1,140
29	900	2,770	1,060	650	.....	975	2,490	7,260	6,410	3,980	1,230	1,140
30	900	2,770	1,060	650	.....	975	2,490	7,600	6,240	3,980	1,230	1,140
31	900	.....	975	650	.....	975	.....	7,770	.....	3,980	1,230	.....
1907–8.												
1	1,140	765	418	480	418	480	1,940	2,770	4,940	6,240	4,780	1,440
2	1,060	765	390	480	418	480	1,810	2,770	4,940	6,240	4,460	1,440
3	1,060	765	390	480	418	448	1,810	2,770	5,260	6,240	4,300	1,440
4	1,060	765	390	480	418	448	1,680	2,770	5,260	6,410	3,980	1,440
5	1,060	765	390	480	418	448	1,560	2,920	5,420	6,580	3,670	1,440
6	1,060	765	364	515	418	448	1,440	3,070	5,580	6,580	3,670	1,330
7	1,060	705	364	515	448	448	1,440	3,070	5,740	6,580	3,370	1,330
8	1,060	650	364	515	448	448	1,440	3,220	6,070	6,580	3,220	1,330
9	1,060	650	364	515	448	448	1,440	3,370	6,410	6,580	2,920	1,230
10	1,060	650	390	515	480	448	1,440	3,370	6,920	6,750	2,770	1,230
11	1,060	650	390	480	480	480	1,440	3,520	7,260	6,750	2,490	1,230
12	1,060	650	364	515	480	480	1,440	3,670	7,600	6,750	2,210	1,230
13	1,060	600	364	515	480	515	1,440	3,670	7,940	6,750	1,940	1,230
14	1,060	555	364	515	448	555	1,440	3,670	8,280	6,580	1,810	1,230
15	975	555	364	515	448	3,370	1,440	3,670	8,640	6,580	1,680	1,230
16	975	555	364	515	480	3,220	1,440	3,820	8,640	6,920	1,560	1,230
17	975	555	364	515	480	3,070	1,560	3,820	8,820	6,920	1,680	1,230
18	975	515	390	515	480	3,070	1,680	3,980	8,280	6,920	1,680	1,140
19	900	515	390	555	480	2,770	1,810	3,980	7,940	6,750	1,680	1,140
20	900	480	390	555	480	2,770	1,940	4,140	7,770	6,580	1,810	1,060
21	900	480	390	515	480	2,630	2,210	4,460	7,430	6,580	1,810	1,060
22	900	480	390	515	480	2,490	2,210	4,300	7,260	6,580	1,810	1,060
23	900	480	390	515	480	2,490	2,350	4,300	6,920	6,410	1,810	1,060
24	900	480	418	515	448	2,350	2,490	4,460	6,750	6,240	1,680	1,060
25	900	448	418	480	448	2,210	2,490	4,620	6,580	6,070	1,680	975
26	900	448	418	480	480	2,210	2,490	4,780	6,410	5,900	1,680	900
27	900	418	418	448	448	2,070	2,490	4,940	6,240	5,740	1,680	900
28	830	418	418	480	448	1,940	3,070	4,940	6,240	5,580	1,680	900
29	830	418	448	480	448	1,940	2,630	4,940	6,070	5,260	1,680	900
30	830	418	480	480	.....	1,810	2,630	4,940	6,070	5,100	1,560	900
31	830	.....	480	480	.....	1,940	.....	4,940	.....	4,940	1,440	.....

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Daily discharge, in second feet, of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1913 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1908–9.												
1	830	418	900	650	600	555	600	2,070	5,260	6,070	3,370	1,080
2	830	418	830	650	600	515	650	2,210	5,580	5,900	3,370	1,080
3	830	418	765	650	555	515	650	2,210	5,900	5,900	3,220	1,080
4	765	418	765	600	555	480	650	2,070	6,240	5,900	3,070	1,080
5	765	418	765	600	555	480	705	2,070	6,580	5,740	3,070	1,080
6	765	418	830	555	555	515	705	1,940	6,580	5,580	2,920	1,080
7	765	418	900	555	555	2,630	765	1,940	6,580	5,900	2,770	1,140
8	765	448	900	555	555	2,490	705	1,940	6,750	5,900	2,770	1,230
9	765	448	830	555	555	2,490	650	1,940	6,920	5,740	2,630	1,230
10	765	480	830	555	555	2,350	650	2,070	6,920	5,740	2,490	1,230
11	765	480	830	555	555	2,350	650	2,210	7,260	5,740	418	1,230
12	765	480	765	555	555	2,210	2,490	2,210	7,260	5,580	418	1,230
13	765	480	765	555	515	2,070	2,210	2,210	7,260	5,580	418	1,230
14	705	448	765	515	555	1,940	2,210	2,210	7,260	5,580	418	1,230
15	705	448	765	515	555	1,810	1,940	2,210	7,430	5,580	480	1,230
16	705	480	705	555	555	1,680	1,810	2,210	7,600	5,420	515	1,230
17	705	515	705	515	600	1,440	1,810	2,350	7,600	5,260	555	1,230
18	650	555	650	555	600	1,330	1,680	2,490	7,600	5,100	555	1,140
19	650	650	650	555	555	1,230	1,680	2,490	7,600	4,940	600	1,230
20	650	765	650	555	555	1,060	1,810	2,630	7,600	4,620	650	1,230
21	650	900	650	515	555	1,060	1,940	2,920	7,600	4,300	650	1,230
22	650	900	650	515	555	975	1,940	3,070	7,430	4,300	705	1,230
23	650	975	600	480	600	515	2,210	3,370	7,260	4,140	765	1,230
24	650	1,060	600	480	555	555	2,070	3,670	7,090	3,980	765	1,230
25	650	1,060	555	480	555	555	1,940	3,670	6,920	3,980	830	1,230
26	600	975	555	480	555	555	1,940	3,820	6,580	3,820	830	1,080
27	555	975	555	480	515	555	1,940	3,980	6,580	3,670	900	1,080
28	418	975	600	480	555	600	1,940	3,980	6,580	3,670	900	1,080
29	418	900	600	480	.....	600	1,940	4,140	6,410	3,670	900	900
30	418	900	650	515	.....	650	2,070	4,460	6,240	3,520	975	900
31	418	.....	650	555	.....	650	.....	4,940	.....	3,520	1,060	.....
1909–10.												
1	830	650	2,490	900	600	830	3,370	4,780	7,940	5,260	3,670	555
2	765	650	2,210	975	650	900	3,370	5,260	7,940	5,420	3,670	600
3	765	765	2,210	900	650	900	3,220	5,580	7,940	5,260	3,520	765
4	765	705	2,490	830	650	1,060	3,070	5,900	7,770	5,260	3,370	765
5	765	705	2,210	765	650	1,140	3,070	6,240	7,600	5,260	3,370	705
6	830	650	2,210	830	650	1,140	2,920	6,240	7,600	5,260	3,370	765
7	900	650	2,210	830	650	1,230	2,770	6,410	7,600	5,260	3,220	765
8	900	705	2,210	765	650	1,230	2,770	5,680	7,430	5,260	3,070	765
9	900	765	2,210	765	650	1,230	2,770	6,920	7,430	5,260	3,070	765
10	900	705	2,210	765	650	1,230	2,770	7,430	7,260	5,260	2,490	765
11	830	650	2,210	705	650	1,140	2,770	7,770	7,260	5,260	1,940	705
12	900	650	2,210	650	650	1,230	2,770	7,940	7,260	5,420	1,940	765
13	830	650	2,350	650	650	1,230	2,630	8,280	7,260	5,580	1,940	765
14	830	600	1,940	650	650	1,140	2,630	8,460	7,090	5,580	1,810	765
15	765	650	1,940	650	650	1,940	2,490	8,280	6,920	5,740	1,680	765
16	765	650	1,940	650	650	2,210	2,490	8,110	6,920	5,740	1,560	765
17	765	650	1,680	650	600	2,920	2,490	7,940	6,920	5,580	1,440	765
18	765	705	1,560	705	600	3,070	2,630	7,940	6,750	5,580	1,330	765
19	765	765	1,440	765	555	3,370	2,630	7,940	6,580	5,420	555	765
20	650	705	1,440	765	555	3,670	2,770	7,770	6,580	5,260	555	830
21	650	765	1,330	830	515	3,670	2,770	7,770	6,410	5,260	515	765
22	650	830	1,230	830	555	3,820	2,770	7,940	6,240	4,940	480	765
23	650	900	1,230	900	555	3,980	2,770	7,940	6,240	4,940	480	765
24	705	1,060	1,330	830	600	3,820	2,920	7,940	5,900	4,620	555	765
25	765	1,330	1,230	765	555	3,820	3,220	8,110	5,580	4,620	555	765
26	650	1,440	1,230	765	555	3,820	3,520	8,110	5,420	4,300	600	830
27	650	1,680	1,140	765	650	3,820	3,980	8,280	5,420	4,300	650	765
28	650	1,680	1,060	765	705	3,670	3,980	8,280	5,260	4,140	650	830
29	680	1,940	1,060	650	.....	3,670	4,300	8,280	5,260	3,980	650	900
30	600	2,210	975	650	.....	3,670	4,300	8,110	5,420	3,980	600	830
31	650	.....	900	650	.....	3,520	.....	7,940	.....	3,980	555	.....

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Daily discharge, in second-feet, of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1913 and 1918—Continued.

Day.	Oct.	Nov	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1910–11.												
1	900	2,210	1,810	418	364	418	2,630	2,490	5,100	5,580	2,490	900
2	900	2,210	1,680	390	364	418	2,630	2,490	5,260	5,580	2,490	900
3	3,670	2,070	1,680	364	364	418	2,490	2,630	5,580	5,580	2,490	900
4	3,670	1,940	1,440	364	390	390	2,490	2,770	5,580	5,580	2,630	900
5	3,670	1,940	1,440	364	418	418	2,490	2,770	5,420	5,260	2,490	900
6	3,670	1,940	1,440	390	390	418	2,350	2,770	5,580	5,260	2,490	900
7	3,670	1,940	1,440	418	364	418	2,350	2,920	5,580	5,260	2,490	975
8	3,670	1,940	1,330	390	390	418	2,490	3,070	5,580	5,260	2,490	1,060
9	3,670	1,940	1,230	364	364	418	2,350	3,070	5,580	4,940	2,490	1,060
10	3,520	1,810	1,230	364	390	418	2,210	3,070	5,900	4,780	2,490	1,060
11	3,370	1,940	1,230	364	418	390	2,210	3,220	5,900	4,620	2,490	1,060
12	3,370	1,940	1,230	364	418	418	2,210	3,370	6,240	4,620	2,490	1,140
13	3,370	1,940	1,230	364	418	418	2,210	3,370	6,240	4,300	2,350	1,230
14	3,070	1,940	1,140	364	418	418	2,070	3,370	6,410	4,300	2,210	1,230
15	3,070	1,940	480	364	390	390	2,070	3,370	6,580	3,980	2,210	1,230
16	2,770	1,810	418	364	364	364	1,940	3,220	6,750	3,980	2,210	1,230
17	2,770	1,940	364	340	364	390	2,070	3,070	7,260	3,820	2,070	1,140
18	2,770	1,940	364	317	364	390	2,210	3,220	7,260	3,820	1,940	1,060
19	2,770	1,940	364	340	390	418	2,210	3,370	7,090	3,670	1,940	1,060
20	2,770	2,070	390	364	418	418	2,210	3,370	7,090	3,670	1,940	1,060
21	2,770	1,940	418	340	418	418	2,210	3,370	6,920	3,670	1,940	1,060
22	2,630	1,940	448	364	418	555	2,210	3,370	7,090	3,370	1,940	900
23	2,490	1,810	480	340	390	650	2,070	3,520	6,920	3,370	1,940	900
24	2,490	1,680	515	317	418	650	1,940	3,670	7,090	3,070	1,940	975
25	2,490	1,680	480	340	390	1,230	2,070	3,670	6,920	3,070	1,940	975
26	2,490	1,680	480	364	364	1,230	2,210	3,520	6,750	2,770	1,940	900
27	2,490	1,680	480	364	364	1,330	2,210	3,980	6,580	2,770	1,810	830
28	2,350	1,680	480	364	364	1,680	2,210	4,300	6,410	2,770	900	830
29	2,490	1,810	448	364	.....	1,940	2,350	4,300	6,240	2,630	830	765
30	2,350	1,940	418	364	.....	2,210	2,490	4,620	6,240	2,490	900	765
31	2,210	.....	418	340	.....	2,490	.....	4,940	.....	2,490	900	.....
1911–12.												
1	830	390	390	418	448	480	480	2,490	6,070	7,260	975	1,230
2	900	364	418	418	480	480	480	2,490	5,900	7,260	975	1,230
3	830	340	418	390	448	480	515	2,490	5,900	7,090	975	1,140
4	705	364	448	390	480	480	555	2,630	5,900	6,920	1,060	1,060
5	765	390	480	418	480	480	600	2,630	5,900	6,920	1,060	1,060
6	705	364	480	418	480	480	650	2,770	5,900	6,920	1,060	1,060
7	650	390	515	448	480	448	765	2,770	5,900	6,750	1,060	1,060
8	600	418	480	448	448	448	900	2,770	5,900	6,580	1,060	1,060
9	1,060	448	515	448	480	480	900	2,770	5,900	6,580	1,140	1,060
10	975	448	515	418	480	448	1,060	2,920	6,070	6,410	1,140	975
11	975	418	480	418	480	448	1,060	3,370	6,070	5,900	1,230	975
12	830	390	480	390	480	448	2,210	3,670	6,070	5,900	1,230	900
13	705	390	480	390	448	448	2,490	3,980	6,070	5,580	1,230	900
14	600	418	448	390	480	448	2,490	4,620	6,070	4,780	1,330	900
15	555	448	480	418	480	448	2,490	4,940	6,240	4,620	1,440	900
16	515	418	480	390	480	448	2,630	5,420	6,240	4,300	1,560	900
17	555	448	515	418	515	448	2,630	5,580	6,240	4,300	1,680	830
18	515	418	515	418	515	448	2,490	5,900	6,240	4,140	1,680	765
19	555	418	480	448	515	448	2,490	6,410	6,240	3,980	1,680	705
20	515	390	448	448	515	448	2,630	6,580	6,240	3,820	1,560	600
21	480	364	418	418	515	418	2,770	6,580	6,240	3,820	1,560	650
22	480	390	448	448	515	418	2,770	6,580	6,240	3,670	1,680	650
23	515	418	448	448	515	418	2,770	6,580	6,240	1,940	1,680	650
24	480	418	480	480	515	418	2,770	6,580	6,410	1,560	1,680	650
25	448	418	448	480	480	448	2,770	6,580	6,410	1,140	1,680	650
26	418	390	480	515	515	448	2,770	6,580	6,580	1,060	1,680	600
27	390	418	480	515	480	448	2,770	6,580	6,580	1,060	1,680	600
28	390	418	448	480	480	448	2,770	6,580	6,750	975	1,560	555
29	418	390	418	448	480	480	2,770	6,410	7,260	900	1,440	555
30	390	364	418	480	.....	480	2,630	6,410	7,260	975	1,440	555
31	418	.....	448	480	.....	480	.....	6,240	.....	900	1,330	.....

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Daily discharge, in second-feet, of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1913 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912-13.												
1	555	448	418	464	448	515	980	2,180	6,910	6,820	4,060	1,240
2	555	418	418	480	448	498	980	2,180	7,340	6,820	3,430	1,100
3	555	418	480	448	448	480	942	2,050	8,190	6,650	3,210	1,060
4	555	418	448	480	448	480	904	2,050	8,530	6,310	2,990	1,450
5	555	448	480	449	448	480	904	2,050	8,710	6,140	2,990	1,800
6	518	448	448	418	418	480	904	2,050	8,710	6,060	2,990	1,800
7	480	448	448	448	480	480	904	2,050	8,530	5,980	2,990	1,800
8	515	448	433	448	480	480	833	2,180	8,530	5,980	2,990	1,800
9	515	448	418	448	480	480	833	2,310	8,530	5,820	2,850	1,680
10	480	448	418	418	480	480	833	2,710	9,070	5,820	2,850	1,680
11	480	448	418	448	480	480	868	2,850	9,070	5,820	2,850	1,680
12	480	480	418	448	480	390	904	2,990	8,890	5,660	2,850	1,560
13	480	480	418	448	480	1,940	982	3,130	8,890	5,420	2,710	1,450
14	480	480	418	448	480	1,940	1,060	3,280	8,890	5,180	2,710	1,340
15	480	448	418	418	480	2,070	1,240	3,280	8,620	5,180	2,440	1,240
16	480	448	418	448	480	2,000	1,240	3,430	8,360	4,860	2,440	1,200
17	448	464	418	448	480	1,940	1,240	3,430	8,190	4,700	2,310	1,200
18	448	480	433	448	480	1,940	1,450	3,430	7,680	4,540	2,180	1,240
19	448	480	448	464	480	1,680	1,560	3,430	7,680	4,540	1,340	1,240
20	433	480	448	480	515	1,680	1,680	3,430	7,850	4,620	1,240	1,200
21	418	448	418	480	515	1,560	1,800	3,580	7,680	4,700	1,240	1,220
22	448	480	418	480	515	1,440	1,920	3,580	7,600	4,860	1,240	1,240
23	448	448	418	480	515	1,380	1,920	3,900	7,510	5,020	1,240	1,100
24	418	448	448	480	515	1,330	1,920	4,220	7,510	5,180	1,130	1,020
25	448	448	433	480	480	1,230	1,920	4,540	7,340	5,180	1,020	1,060
26	448	480	418	480	480	1,230	2,050	4,860	7,170	5,180	1,100	1,020
27	448	480	418	480	480	1,140	1,800	5,180	7,170	4,990	1,100	980
28	448	449	418	448	448	1,140	2,180	5,820	6,310	4,810	1,060	980
29	448	418	433	480	.....	1,230	2,180	5,980	6,560	4,620	1,150	980
30	418	418	448	480	.....	1,140	2,180	6,230	6,820	4,430	1,240	833
31	448	.....	448	480	.....	1,060	.....	6,480	.....	4,250	1,240	.....
1917-18.												
1	870	465	530	4,040	1,700	605	1,280	3,100	4,150	6,520	2,880	1,060
2	810	495	530	5,570	1,700	605	1,280	3,250	4,150	6,340	3,180	1,060
3	940	465	530	5,570	1,700	605	1,280	3,550	4,150	6,340	2,880	1,060
4	940	480	530	5,570	1,700	605	1,280	4,000	4,150	6,070	2,520	1,150
5	940	495	565	5,410	1,700	605	1,280	4,150	4,220	5,800	2,160	1,150
6	940	495	530	5,170	1,280	605	1,280	4,300	4,300	5,690	2,160	1,150
7	940	530	565	4,930	1,580	605	1,280	4,450	4,450	5,570	2,030	1,060
8	940	495	565	4,770	1,380	470	1,280	4,610	4,770	5,460	2,160	1,060
9	940	495	580	4,450	1,280	330	1,280	4,450	5,420	5,120	2,030	1,060
10	940	465	595	4,300	1,280	330	1,280	4,450	6,080	5,120	2,030	1,060
11	870	495	605	4,000	1,280	330	1,380	4,450	6,590	5,120	1,900	1,060
12	870	465	530	3,700	1,280	330	1,480	4,380	6,930	5,120	1,780	1,060
13	870	495	530	3,620	1,280	330	1,580	4,300	7,270	4,950	1,660	1,060
14	840	495	530	3,550	1,280	330	1,580	4,450	8,140	4,860	1,780	1,060
15	810	465	530	3,250	1,180	350	1,580	4,610	8,140	4,780	1,780	1,060
16	940	465	650	3,100	1,280	1,100	1,580	4,930	8,080	4,780	1,660	1,060
17	755	465	755	3,100	1,230	1,190	1,580	4,930	8,020	4,780	1,660	1,060
18	700	465	870	2,950	1,180	1,280	1,580	4,930	7,960	4,780	1,660	1,150
19	700	465	940	2,800	605	1,380	1,700	4,850	7,780	4,780	1,660	1,150
20	605	465	940	2,650	565	1,280	1,700	4,770	7,780	4,780	1,150	1,150
21	605	465	870	2,500	565	1,280	1,760	4,690	7,600	4,620	845	1,150
22	605	495	940	2,360	585	1,180	1,820	4,610	7,780	4,450	910	1,150
23	605	530	980	2,360	605	1,180	1,940	4,460	7,870	4,290	980	1,150
24	605	530	1,020	2,360	605	1,230	2,150	4,310	7,960	3,970	910	1,060
25	605	530	980	2,080	605	1,280	2,360	4,150	7,960	3,490	980	980
26	565	530	940	2,080	605	1,280	2,500	4,000	7,600	3,180	1,060	980
27	605	565	870	2,080	605	1,280	2,500	3,850	7,420	3,180	1,060	980
28	570	530	940	2,080	650	1,280	2,580	3,700	7,240	3,030	1,060	980
29	530	530	1,100	1,940	.....	1,280	2,650	3,700	7,000	2,880	980	980
30	495	530	1,800	1,820	.....	1,280	2,800	3,920	6,760	2,880	980	980
31	495	.....	2,500	1,700	.....	1,280	.....	4,150	.....	2,880	1,060	.....

NOTE.—Records Nov. 1, 1903, to March 31, 1913, revised since publication in previous water-supply papers. Discharge Nov. 1-5, 1913, estimated same as for Nov. 6-11. Discharge interpolated for Sundays beginning August 18, 1912, and a very few other days, when gage was not read. Sudden increase or decrease in daily discharge due to operation of flashboard dam at outlet of lake. Revised records excellent.

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Monthly discharge of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1918.

[Drainage area, 950 square miles.]

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
1903–4.									
October	.....	.....	.....	.....	.....	74,100	1,210	1.27	1.46
November	.....	1,440	1,710	102,000	− 21,500	80,500	1,350	1.42	1.58
December	1,680	1,060	1,280	78,700	− 17,700	61,000	992	1.04	1.20
January	1,060	830	935	57,500	− 12,200	45,300	737	.776	.89
February	1,060	555	904	52,000	− 9,900	42,100	732	.771	.83
March	1,440	830	1,050	64,600	− 20,600	44,000	716	.754	.87
April	5,580	1,060	2,730	162,000	+176,000	338,000	5,680	5.98	6.67
May	7,600	4,620	5,730	352,000	+ 88,000	440,000	7,160	7.54	8.69
June	8,280	6,920	7,620	453,000	− 48,000	405,000	6,810	7.17	8.00
July	8,280	4,140	6,520	401,000	− 36,000	365,000	5,940	6.25	7.21
August	4,460	765	3,060	188,000	− 69,000	119,000	1,940	2.04	2.35
September	1,810	765	1,330	79,100	− 29,100	50,000	840	.884	.99
The year	.....	.....	.....	.....	0	2,060,000	2,840	2.99	40.74
1904–5.									
October	1,060	765	910	56,000	− 21,800	34,200	556	.585	.67
November	900	765	807	48,000	− 10,800	37,200	625	.658	.73
December	830	765	786	48,300	− 11,600	36,700	597	.628	.72
January	765	705	742	45,600	− 4,500	41,100	668	.703	.81
February	830	705	757	42,000	− 14,000	28,000	504	.531	.55
March	2,490	765	1,900	117,000	+ 13,000	130,000	2,110	2.22	2.56
April	3,670	1,940	2,330	139,000	+ 28,000	167,000	2,810	2.96	3.30
May	4,940	3,370	3,870	238,000	+ 22,000	260,000	4,230	4.45	5.13
June	8,280	5,420	7,160	426,000	+ 37,000	463,000	7,780	8.19	9.14
July	6,410	4,140	5,080	312,000	− 11,000	301,000	4,900	5.16	5.96
August	3,980	975	2,190	135,000	− 6,000	129,000	2,100	2.21	2.55
September	1,440	1,060	1,300	77,400	− 20,300	57,100	960	1.01	1.13
The year	8,280	705	2,330	1,680,000	0	1,680,000	2,330	2.45	33.24
1905–6.									
October	2,350	1,330	1,760	108,000	− 25,500	82,500	1,340	1.41	1.63
November	1,560	900	1,160	69,000	− 21,900	47,100	792	.834	.93
December	900	765	816	50,200	− 18,300	31,900	519	.546	.63
January	1,140	765	854	52,500	− 17,500	35,000	569	.599	.69
February	975	900	913	50,700	− 15,100	35,600	641	.675	.70
March	1,940	900	1,220	75,000	− 31,300	43,700	711	.748	.86
April	3,370	1,060	2,080	124,000	+ 80,000	204,000	3,430	3.61	4.03
May	5,100	3,670	4,580	282,000	+ 76,000	358,000	5,820	6.13	7.07
June	4,780	3,070	4,120	245,000	+ 42,000	287,000	4,820	5.07	5.66
July	4,780	2,920	4,020	247,000	− 35,000	212,000	3,450	3.63	4.18
August	2,770	1,230	1,740	107,000	− 14,000	93,000	1,510	1.59	1.83
September	1,440	1,060	1,200	71,400	− 19,400	52,000	874	.920	1.06
The year	5,100	765	2,050	1,480,000	0	1,480,000	2,050	2.16	29.24
1906–7.									
October	1,140	765	911	56,000	− 2,000	54,000	878	.924	1.07
November	3,520	765	1,980	118,000	+ 12,000	130,000	2,180	2.29	2.56
December	2,770	975	1,870	115,000	− 69,200	45,800	745	.784	.90
January	909	600	746	45,900	− 18,300	27,600	449	.473	.54
February	1,140	650	841	46,700	− 2,500	44,200	796	.838	.87
March	1,140	975	1,060	65,200	− 11,800	53,400	868	.914	1.05
April	2,490	900	1,600	95,200	+ 48,800	144,000	2,420	2.55	2.84
May	7,770	2,770	5,340	328,000	+143,000	471,000	7,660	8.06	9.29
June	8,460	5,580	6,840	407,000	− 17,000	390,000	6,550	6.89	7.69
July	6,410	3,980	4,990	307,000	− 45,000	262,000	4,260	4.48	5.16
August	3,820	1,140	2,270	140,000	− 25,000	115,000	1,870	1.97	2.27
September	1,230	1,140	1,190	70,800	− 13,000	57,800	971	1.02	1.14
The year	8,460	600	2,480	1,790,000	0	1,790,000	2,480	2.61	35.38
1907–8.									
October	1,140	830	975	60,000	− 24,700	35,300	574	.604	.70
November	765	418	579	34,500	− 400	34,100	573	.603	.67
December	480	364	395	24,300	+ 11,600	35,900	584	.615	.71
January	555	448	502	30,900	+ 3,100	34,000	553	.582	.67
February	480	418	456	26,200	+ 1,900	28,100	489	.515	.56
March	3,370	448	1,580	97,200	− 44,500	52,700	857	.902	1.04
April	3,070	1,440	1,890	112,000	+ 10,000	122,000	2,050	2.16	2.41
May	4,940	2,770	3,860	237,000	+ 53,000	290,000	4,720	4.97	5.73
June	8,820	4,940	6,790	404,000	+ 26,000	430,000	7,230	7.61	8.49

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Monthly discharge of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1918—Continued.

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
1907–8.									
July	6,920	4,940	6,340	390,000	+ 16,000	406,000	6,600	6.95	8.01
August	4,780	1,440	2,390	147,000	− 27,000	120,000	1,950	2.05	2.36
September	1,440	900	1,180	70,200	− 25,000	45,200	760	.800	.89
The year	8,820	364	2,250	1,630,000	0	1,630,000	2,250	2.36	22.24
1908–9.									
October	830	418	677	41,600	− 16,500	25,100	408	.429	.49
November	1,060	418	641	38,100	+ 3,000	41,100	691	.727	.81
December	900	555	717	44,100	− 20,200	23,900	389	.409	.47
January	650	480	542	33,300	− 11,100	22,200	361	.380	.44
February	600	515	560	31,100	− 11,600	19,500	351	.369	.38
March	2,630	480	1,210	74,400	− 42,700	31,700	516	.543	.63
April	2,490	600	1,500	89,300	− 2,900	86,400	1,450	1.53	1.71
May	4,940	1,940	2,760	170,000	+ 63,000	233,000	3,790	3.99	4.60
June	7,600	5,260	6,880	409,000	+ 53,000	462,000	7,760	8.17	9.12
July	6,070	3,520	4,980	306,000	− 4,000	302,000	4,910	5.17	5.96
August	3,370	418	1,620	87,300	+ 16,700	104,000	1,690	1.78	2.05
September	1,330	900	1,150	68,400	− 26,700	41,700	701	.738	.82
The year	7,600	418	1,920	1,390,000	0	1,390,000	1,920	2.02	27.48
1909–10.									
October	900	600	755	46,400	− 15,700	30,700	499	.525	.61
November	2,216	600	915	54,400	+ 41,000	95,400	1,600	1.68	1.87
December	2,490	900	1,740	107,000	− 36,600	70,400	1,140	1.20	1.38
January	975	650	760	46,700	− 9,700	37,000	602	.634	.73
February	705	515	629	34,400	− 6,000	28,400	511	.538	.56
March	3,980	830	2,390	147,000	− 25,000	122,000	1,980	2.08	2.40
April	4,300	2,490	3,030	180,000	+107,000	287,000	4,820	5.07	5.66
May	8,460	4,780	7,430	457,000	+ 56,000	513,000	8,340	8.78	10.12
June	7,940	5,260	6,770	403,000	− 81,000	322,000	5,410	5.69	6.35
July	5,740	3,980	5,060	311,000	− 39,000	272,000	4,420	4.65	5.36
August	3,670	480	1,740	107,000	+ 10,000	117,000	1,900	2.00	2.31
September	900	555	762	45,300	− 1,000	44,300	744	.783	.87
The year	8,460	480	2,680	1,940,000	0	1,940,000	2,680	2.82	38.22
1910–11.									
October	3,670	900	2,850	175,000	− 31,000	144,000	2,340	2.46	2.84
November	2,210	1,680	1,910	114,000	− 10,000	104,000	1,750	1.84	2.05
December	1,810	364	871	53,600	− 7,500	46,100	750	.789	.91
January	418	317	362	22,300	+ 15,000	37,300	607	.639	.74
February	418	364	389	21,600	+ 3,500	25,100	452	.476	.50
March	2,490	364	727	44,700	+ 7,500	52,200	849	.894	1.03
April	2,630	1,940	2,260	134,000	− 6,000	128,000	2,150	2.26	2.52
May	4,940	2,490	3,360	207,000	+ 97,000	304,000	4,940	5.20	6.00
June	7,260	5,100	6,360	375,000	− 21,000	354,000	5,950	6.26	6.98
July	5,580	2,490	4,080	251,000	− 33,000	218,000	3,550	3.74	4.31
August	2,630	830	2,060	127,000	− 14,000	113,000	1,840	1.94	2.24
September	1,230	765	996	59,300	0	59,300	997	1.05	1.17
The year	7,260	317	2,190	1,580,000	+ 500	1,580,000	2,190	2.31	31.29
1911–12.									
October	1,060	390	618	38,000	− 15,000	23,000	374	.394	.45
November	448	340	402	23,900	+ 6,900	30,800	518	.545	.61
December	515	390	464	28,500	− 3,700	24,800	403	.424	.49
January	515	390	437	26,900	− 500	26,400	429	.452	.52
February	515	448	486	28,000	+ 300	28,300	492	.518	.56
March	480	418	454	27,900	0	27,900	454	.478	.55
April	2,770	480	1,940	115,000	0	115,000	1,930	2.03	2.26
May	6,580	2,490	4,800	295,000	+ 56,000	351,000	5,710	6.01	6.93
June	7,260	5,900	6,230	371,000	+ 9,000	380,000	6,390	6.73	7.51
July	7,260	900	4,320	266,000	− 60,000	206,000	3,350	3.53	4.07
August	1,680	975	1,370	84,200	+ 2,500	86,700	1,410	1.48	1.71
September	1,230	555	848	50,500	− 12,300	38,200	642	.676	.75
The year	7,260	340	1,870	1,350,000	− 16,800	1,340,000	1,840	1.94	26.41

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Monthly discharge of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1918—Continued.

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
1912–13.									
October	555	418	477	29,300	− 6,000	23,300	379	.399	.46
November	480	418	458	27,000	0	27,000	454	.478	.53
December	480	418	432	26,600	+ 1,500	28,100	457	.481	.55
January	480	418	460	28,300	− 1,500	26,800	436	.459	.53
February	515	418	477	26,500	− 3,000	23,500	423	.445	.46
March	2,070	390	1,120	68,900	− 40,500	28,400	462	.486	.56
April	2,180	833	1,370	81,500	+ 29,500	111,000	1,870	1.97	2.20
May	6,480	2,050	3,510	216,000	+ 98,000	314,000	5,110	5.38	6.20
June	9,070	6,820	7,960	474,000	0	474,000	7,970	8.39	9.36
July	6,820	4,250	5,360	330,000	− 44,000	286,000	4,650	4.89	5.64
August	4,060	1,020	2,170	133,000	− 11,000	122,000	1,980	2.08	2.40
September	1,890	833	1,310	78,000	− 7,500	70,500	1,180	1.24	1.38
The year	9,070	390	2,100	1,520,000	+ 15,500	1,530,000	2,120	2.23	30.27
1913–14.									
October	868	598	715	44,000	− 3,000	41,000	667	.702	.81
November	890	598	678	40,300	+ 1,000	41,300	694	.731	.82
December	678	424	530	32,600	− 11,700	20,900	340	.358	.41
January	809	454	677	41,600	+ 8,700	50 300	818	.861	.99
February	706	463	544	30 200	− 3,300	26,900	484	.509	.53
March	2,990	484	1,340	82,400	− 27,700	54,700	890	.937	1.08
April	3,280	1,920	2,670	159,000	+ 33,000	192,000	3,230	3.40	3.79
May	6,820	3,280	5,140	316,000	+ 49,000	365,000	5,940	6.25	7.21
June	6,650	4,860	5,730	341,000	− 20,000	321,000	5,390	5.67	6.33
July	5,509	2,850	4,520	278,000	− 40,000	238,000	3,870	4.07	4.69
August	2,850	484	1,280	78,700	+ 7,500	86,200	1,400	1.47	1.70
September	890	550	706	42,000	+ 6,500	48,500	815	.858	.96
The year	6,820	424	2,050	1,490,000	0	1,490,000	2,050	2.16	29.32
1914–15.									
October	920	673	783	48,100	+ 6,000	54,100	880	.926	1.07
November	1,470	1,040	1,250	74,400	+ 5,000	79,400	1,330	1.40	1.56
December	1,210	602	903	55,500	− 11,000	44,500	724	.762	.88
January	648	418	535	32,900	− 8,000	24,900	405	.426	.49
February	482	403	423	23,500	− 8,000	15,500	279	.294	.31
March	1,310	433	579	35,600	+ 23,500	59,100	961	1.01	1.16
April	3,900	1,360	3,410	203,000	− 11,000	192,000	3,230	3.40	3.79
May	3,740	2,990	3,330	205,000	− 5,000	200,000	3,250	3.42	3.94
June	3,130	2,360	2,630	156,000	+ 5,000	161,000	2,710	2.85	3.18
July	2,460	1,210	1,900	117,000	− 2,000	115,000	1,870	1.97	2.27
August	1,820	1,260	1,520	93,500	− 8,800	84,700	1,380	1.45	1.67
September	1,580	418	601	35,800	− 3,200	32,600	548	.577	.64
The year	3,900	403	1,490	1,080,000	− 17,500	1,060,000	1,470	1.55	20.96
1915–16.									
October	466	349	388	23,900	+ 6,000	29,900	486	.512	.59
November	678	482	560	33,300	+ 4,500	37,800	635	.668	.75
December	727	465	607	37,300	− 1,400	35,900	584	.615	.71
January	624	303	500	30,700	−15,500	15,200	247	.260	.30
February	538	465	513	29,500	+ 6,500	36,000	626	.659	.71
March	2,990	500	1,960	121,000	−20,000	101,000	1,640	1.73	1.99
April	3,200	2,070	2,610	155,000	+31,000	186,000	3,130	3.29	3.67
May	5,500	3,280	4,900	301,000	+45,000	346,000	5,630	5.93	6.84
June	9,780	5,180	7,580	451,000	+67,000	518,000	8,710	9.17	10.23
July	8,880	5,340	7,480	460,000	−71,000	389,000	6,330	6.66	7.68
August	5,340	1,580	3,530	217,000	−29,000	188,000	3,060	3.22	3.71
September	1,940	571	1,390	82,700	−17,000	65,700	1,100	1.16	1.29
The year	9,780	303	2,680	1,940,000	+ 6,100	1,980,000	2,680	2.82	38.47

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Monthly discharge of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1918—Continued.

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
1916–17.									
October	870	370	541	33,300	− 8,000	25,300	411	.438	.50
November	392	330	347	20,600	+ 1,500	22,100	371	.391	.44
December	370	330	345	21,200	− 1,500	19,700	320	.337	.39
January	370	.....	297	18,300	− 1,500	16,800	273	.287	.33
February	415	370	398	22,100	− 4,500	17,600	317	.334	.35
March	1,940	392	996	61,200	−42,300	18,900	307	.323	.37
April	905	370	559	33,300	+26,800	60,100	1,010	1.06	1.18
May	6,590	565	3,340	205,000	+97,000	302,000	4,910	5.17	5.96
June	7,440	6,250	6,810	405,000	− 1,000	404,000	6,790	7.15	7.98
July	7,100	4,380	6,260	385,000	−40,000	345,000	5,610	5.91	6.81
August	4,150	1,020	2,040	125,000	− 1,000	124,000	2,020	2.13	2.46
September	1,480	940	1,180	70,200	−12,500	57,700	970	1.02	1.14
The year	7,440	.....	1,940	1,400,000	+13,000	1,410,000	1,950	2.05	27.91
1917–18.									
October	940	495	756	48,500	−17,000	29,500	480	.505	.58
November	565	465	495	29,500	+ 6,500	36,000	605	.637	.71
December	2,500	530	817	50,200	+46,500	96,700	1,570	1.65	1.90
January	5,570	1,700	3,410	210,000	−66,000	144,000	2,340	2.46	2.84
February	1,700	565	1,120	62,200	−13,100	49,100	884	.931	.97
March	1,380	330	874	53,700	−11,900	41,800	680	.716	.83
April	2,800	1,280	1,720	102,000	+36,000	138,000	2,320	2.44	2.72
May	4,930	3,100	4,270	263,000	+56,000	319,000	5,190	5.46	6.30
June	8,140	4,150	6,590	392,000	+ 8,000	400,000	6,720	7.07	7.89
July	6,520	2,880	4,700	289,000	−42,000	247,000	4,020	4.23	4.88
August	3,180	845	1,660	102,000	+ 2,000	104,000	1,690	1.78	2.05
September	1,150	980	1,070	63,700	0	63,700	1,070	1.13	1.26
The year	8,140	330	2,300	1,660,000	+ 5,000	1,670,000	2,300	2.42	32.93

NOTE.—Discharge without storage estimated October, 1903, to December, 1904, and July, 1905, to November, 1910, when a gage-height record for Lake Chelan is not available, by comparison of discharge without storage for remainder of period with records at gaging stations on Wenatchee and Methow rivers.

ENTIAT RIVER BASIN.

ENTIAT RIVER AT ENTIAT, WASH.

LOCATION.—In sec. 18, T. 25 N., R. 21 E., one-eighth mile below power house of Wenatchee Valley Gas & Electric Co. three-fourths mile above Entiat, Chelan County, and 1 mile above mouth.

DRAINAGE AREA.—419 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 5, 1910, to September 30, 1918.

GAGE.—Inclined staff on left bank one-eighth mile below power house; read by L. G. Asher.

DISCHARGE MEASUREMENTS.—Made from private bridge 200 feet below power house or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; shifting. No well-defined control. One channel at all stages. Left bank high; not subject to overflow; right bank slopes gradually.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.98 feet June 14 (discharge, 3,120 second-feet); minimum stage recorded, 0.83 foot November 20 and December 1 and 2 (discharge, 95 second-feet). Discharge may have been as low or lower during period in which stage-discharge relation was affected by ice.

1910–1918: Maximum stage recorded, 5.00 feet June 17, 1916 (discharge, 5,150 second-feet); minimum stage recorded, 0.68 foot November 13, 1916 (discharge, 62 second-feet).

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ICE.—Stage-discharge relation affected by ice; flow estimated from recorded gage heights, discharge measurements, and weather records.

DIVERSIONS.—Several diversions above station for irrigation. Entiat Irrigation Co.'s high-line canal (capacity about 15 second-feet) carries water past station.

REGULATION.—Flow affected by changes in load at power plant.

ACCURACY.—Stage-discharge relation for low stages changed January 1 and June 13; remained permanent for high stages; affected by ice for short periods. Rating curves used prior to change on June 13 fairly well defined; rating curve used after change well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records prior to June 13 good except for ice periods, for which they are fair; after June 13 excellent.

COOPERATION.—Gage-height record furnished by Wenatchee Valley Gas & Electric Co.

Discharge measurements of Entiat River at Entiat, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 4	L. D. Carson	[a] 1.42	258	July 6	L. D. Carson	2.01	633
12	do	1.36	220	Sept. 29	Lee and Calkins	.98	112
Apr. 1	do	1.46	291	29	Calkins and Lee	.92	109
13	do	1.73	428				

[a] Stage-discharge relation slightly affected by ice.

Daily discharge, in second-feet, of Entiat River at Entiat, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	136	111	95	1,290	210	186	286	1,290	1,680	893	268	141
2	155	117	95	1,180		158	290	1,540	1,540	893	268	146
3	155	123	117	990	212	164	281	1,680	1,290	808	289	146
4	155	123	123	904	267	151	276	2,130	1,290	808	289	138
5	155	136	111	904	258	144	276	2,130	1,290	653	268	119
6	148	123	106	904	263	126	286	1,680	1,540	583	268	119
7	136	123		744	233	129	286	1,540	1,830	583	245	119
8	139	120		600	224	129	290	1,410	2,290	583	237	116
9	139	117		533	216	132	314	1,290	2,450	808	229	116
10	130	117		533	216	132	324	1,180	2,950	653	222	124
11	133	120	120	533	224	132	334	1,180	3,120	618	215	124
12	126	120		409	241	132	354	1,240	2,780	583	207	132
13	130	123		409	233	129	409	1,350	3,120	518	207	132
14	130	123		409	220	129	469	1,540	3,120	518	204	129
15	126	117		409	193	132	409	1,610	2,130	518	204	129
16	123	106		409	178	132	381	1,760	1,830	518	207	129
17	120	103	209	381		129	381	1,680	1,680	583	207	124
18	120	103	620	334		132	354	1,540	1,680	518	193	116
19	123	100	420			132	409	1,480	1,540	488	180	116
20	123	95	299			132	469	1,290	1,410	458	164	116
21	120	98		290	140	135	600	1,180	1,410	458	161	116
22	117	148				135	744	1,080	1,540	380	161	116
23	117	148		272		132	904	990	1,540	355	164	114
24	111	145		276		135	904	990	1,480	355	164	114
25	109	148		281		141	990	990	1,410	355	164	114
26	109	136	340	281	186	151	904	990	1,290	355	164	109
27	114	136		276	193	158	904	990	1,130	332	155	114
28	114	130		267	178	164	904	990	1,080	310	152	111
29	100	117			.....	168	990	1,080	984	289	144	111
30	109	100		240	.....	178	990	1,290	938	289	141	114
31	114	.....			.....	224	.....	1,680	.....	289	141	.....

NOTE.—Braced figures show mean discharge for periods when stage-discharge relation was affected by ice.

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Monthly discharge of Entiat River at Entiat, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	155	100	127	7,810
November	148	95	121	7,200
December	.....	.....	230	14,100
January	1,290	.....	497	30,600
February	267	.....	193	10,700
March	224	126	145	8,920
April	990	276	524	31,200
May	2,130	990	1,330	84,800
June	3,120	938	1,780	106,000
July	893	280	527	32,400
August	289	141	203	12,500
September	146	109	122	7,280
The year	3,120	.....	488	353,000

WENATCHEE RIVER BASIN.

WENATCHEE RIVER NEAR LEAVENWORTH, WASH.

LOCATION.—In SW. ¼ sec. 12, T. 26 N., R. 17 E., 1,500 feet below highway bridge, half a mile below Beaver Creek, and 14 miles north of Leavenworth, Chelan County.

DRAINAGE AREA.—591 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 27, 1910, to September 30, 1918.

(Revised records, November 27, 1910, to November 16, 1913, are presented in this paper).

GAGE.—Vertical and inclined staff on left bank 1,500 feet below highway bridge, since September 6, 1913; read by R. E. Nickles and P. H. Hertzog. November 28, 1910, to September 5, 1913, vertical staff 15 feet downstream at same datum.

DISCHARGE MEASUREMENTS.—Made from cable three-eighths mile above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; likely to shift during extremely high water. No well-defined control. One channel at all stages. Banks high and not subject to overflow. Stage of zero flow, according to measurements made February 8 and October 3, 1915, gage height 1.5 feet ± 0.2 foot; according to measurements made September 27, 1918, gage height 1.2 feet ± 0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.10 feet December 30 (discharge, 18,700 second-feet); minimum stage recorded, 2.70 feet October 21, 23–25, 30, 31 (discharge, 405 second-feet).

1910–1918: Maximum stage in 1918; minimum stage recorded, 2.53 feet October 11 and 12, 1915 (discharge, 316 second-feet).

ICE.—Stage-discharge relation generally affected by ice during winter, but not affected during current year.

DIVERSIONS.—Wenatchee Park Land & Irrigation Co. divert water from Chiwawa River for short periods during irrigation season.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during 1918. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

COOPERATION.—Gage-height record furnished by Quincy Valley Irrigation District.

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Discharge measurements of Wenatchee River near Leavenworth, Wash., during the years ending Sept. 30, 1912–1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1911–12.				1917–18.			
May 21	R. C. Pierce	8.50	[a] 11,300	Feb. 2	L. D. Carson	3.70	1,300
				Jan. 10	do	7.98	10,200
1913–14.				Sept. 28	Calkins and Lee	2.86	494
July 11	C. O. Brown	5.22	[a] 3,400				
1914–15.							
June 10	J. T. Hartson	4.38	[a] 2,130				

[a] Records previously published corrected on account of arrangement of meter and weight or weights.

NOTE.—Discharge measurements made prior to 1918 listed in this table are only those which have been revised. Other measurements made prior to 1918 will be found in the earlier water-supply papers.

Daily discharge, in second-feet, of Wenatchee River near Leavenworth, Wash., for the period Nov. 27, 1910, to Nov. 30, 1913.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.
1910–11.											
1		2,080	915	708	468	2,360	4,490	8,760	3,290	1,430	804
2		1,940	860	756	501	2,360	4,690	9,300	3,290	1,430	852
3		1,810	915	756	501	2,360	4,690	8,760	3,390	1,430	900
4		1,810	915	756	501	2,220	5,330	6,710	3,390	1,380	1,000
5		1,680	915	661	468	2,080	5,110	5,330	3,390	1,320	804
6		1,620	970	661	501	2,080	4,900	5,110	3,740	1,380	804
7		1,550	1,140	618	501	2,010	3,560	4,900	3,740	1,210	804
8		1,490	1,140	618	501	1,940	4,110	4,900	3,070	1,100	714
9		1,370	1,110	618	501	2,080	3,920	5,110	2,910	1,050	672
10		1,310	1,080	618	501	2,080	3,740	5,110	2,610	1,000	714
11		1,310	1,020	618	501	2,080	3,390	6,950	2,460	1,000	672
12		1,250	915	618	501	2,080	3,390	8,760	2,610	900	714
13		1,190	808	618	501	1,940	3,230	10,100	2,760	900	714
14		1,140	756	618	538	1,810	3,150	10,400	2,910	900	804
15		1,020	708	576	576	1,810	3,070	9,570	3,070	852	1,100
16		970	808	576	576	1,810	3,740	8,760	3,560	804	1,210
17		970	860	576	661	1,810	4,300	7,710	3,740	804	1,050
18		970	860	576	708	1,810	4,200	6,230	3,740	804	900
19		970	860	538	808	1,810	4,110	5,770	3,070	900	804
20		970	860	501	970	1,810	3,920	4,900	2,610	804	759
21		970	860	501	1,140	2,080	3,740	4,490	2,460	759	716
22		970	860	501	1,310	2,220	4,490	4,690	2,050	714	672
23		970	860	501	1,550	2,650	4,110	4,900	1,920	759	672
24		1,080	915	501	1,810	3,100	4,110	4,300	2,050	714	630
25		1,080	756	501	1,810	4,530	4,110	3,740	2,050	714	590
26		1,050	756	501	1,810	4,530	3,920	4,200	1,980	714	550
27	2,800	1,020	756	501	1,680	4,370	3,920	4,900	1,920	714	550
28	2,500	1,020	756	468	1,550	4,210	4,110	4,690	1,670	714	513
29	2,360	970	808		1,620	4,050	4,490	3,740	1,670	714	513
30	2,220	1,020	708		1,810	4,210	5,330	3,560	1,670	759	476
31		970	708		2,080		7,200		1,550	804	

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Daily discharge, in second-feet, of Wenatchee River near Leavenworth, Wash., for the period Nov. 27, 1910, to Nov. 30, 1913—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911-12.												
1	476	346	1,380		900	630	1,430	3,230	5,330	4,110	1,550	950
2	476	335	1,260		852	630	1,670	3,230	5,770	3,740	1,430	900
3	459	335	1,160	500	804	630	1,920	3,230	5,770	3,390	1,380	804
4	442	335	1,100		714	630	2,050	3,390	6,000	3,390	1,260	738
5	408	346	1,050		714	630	1,920	3,390	6,230	3,390	1,210	672
6	408	408	1,000	550	714	590	1,920	3,740	6,710	3,230	1,100	630
7	408	476	950	550	759	590	1,790	4,300	7,710	3,070	1,050	714
8	408	714	900	632	759	550	1,920	6,000	8,490	2,910	1,130	714
9	408	630	1,100	714	804	550	2,050	7,200	8,760	2,910	1,210	630
10	408	550	1,050	590	804	550	2,460	7,710	7,710	2,760	1,180	630
11	377	476	1,000	550	804	550	2,760	7,450	7,970	3,070	1,160	630
12	377	476	1,000	590	804	550	2,760	7,200	7,970	3,070	1,100	610
13	377	476	900	590	804	550	2,610	7,710	7,710	3,070	1,000	590
14	408	476	900	804	759	550	2,320	8,760	6,710	3,070	1,000	610
15	476	550	900	1,000	759	550	2,320	9,840	5,330	2,760	1,100	630
16	476	550	900	950	804	550	2,320	9,570	4,490	2,760	1,210	590
17	442	550	804	900	900	550	2,320	8,230	4,900	2,760	1,260	550
18	408	1,260	804	1,050	804	590	2,460	7,200	5,770	2,610	1,050	550
19	408	3,920	804	804	900	550	2,460	6,950	6,710	2,460	1,000	550
20	408	4,300	804	804	900	550	2,320	9,300	8,230	2,460	950	550
21	408	3,740	714	804	852	550	2,320	11,500	8,490	2,460	1,000	550
22	377	2,760	759	804	804	513	2,320	10,400	6,710	2,320	950	550
23	377	2,180	852	759	804	550	2,460	7,710	6,230	2,180	1,000	513
24	377	1,920	759	804	759	550	2,460	7,200	7,200	1,920	1,000	513
25	346	1,670	714	804	714	590	2,460	6,710	7,710	1,920	1,000	476
26	346	2,460	714	804	714	630	2,460	7,200	7,710	1,670	950	456
27	346	2,050	714	759	714	852	2,610	7,200	7,710	1,490	852	449
28	346	1,790	672	759	672	1,100	2,610	6,710	6,000	1,490	759	442
29	346	1,670	672	804	672	1,210	3,070	6,470	4,690	1,440	736	442
30	346	1,490	630	1,000	.....	1,210	3,230	5,770	4,110	1,380	714	442
31	340	.....	630	1,000	.....	1,260	.....	5,110	.....	1,380	759	.....
1912-13.												
1	442	476	804	610		804	772	2,640	11,500	7,970	2,760	950
2	456	476	804	630		804	772	2,920	12,900	6,710	2,910	900
3	462	476	1,000	852		804	772	2,640	14,000	6,000	3,070	900
4	462	494	1,000	804		759	772	2,640	14,300	5,780	2,760	1,920
5	462	513	950	804	590	759	810	2,380	12,600	5,550	2,610	2,760
6	462	550	900	630		759	810	2,640	11,500	6,230	2,460	2,180
7	428	590	804	672		804	810	3,210	10,700	7,200	2,460	1,670
8	435	630	804	630		804	810	4,340	11,000	6,710	2,460	1,490
9	442	630	759	672	590	804	850	6,720	11,200	6,230	2,180	1,380
10	428	630	714	630	590	852	890	7,380	10,400	6,230	2,050	1,320
11	428	630	714	630	590	900	1,060	6,940	10,100	6,230	1,920	1,210
12	428	630	714	630	590	900	1,300	6,300	10,100	5,770	1,920	1,210
13	408	630	672	630	590	876	1,780	5,800	10,400	5,110	1,670	1,100
14	408	714	672	630	590	852	2,010	5,700	10,100	4,420	1,490	1,000
15	402	714	630	590	630	852	2,380	5,300	8,760	3,740	1,430	1,000
16	496	630	630	590	852	852	2,510	4,900	7,740	3,740	1,320	950
17	590	630	672	590	1,260	850	2,640	4,700	6,710	3,740	1,260	950
18	590	672	672	550	1,320	890	2,780	4,700	6,710	4,110	1,210	1,000
19	590	861	672	550	1,260	890	3,360	4,520	8,230	4,690	1,160	950
20	550	1,050	630		1,210	890	3,830	4,900	9,570	5,550	1,100	900
21	513	1,000	550	550	1,160	850	4,160	5,700	9,030	6,230	1,050	900
22	513	1,000	590		1,100	810	3,990	6,500	8,490	6,230	1,100	950
23	513	1,000	590	550	1,050	810	3,670	7,380	8,230	6,000	1,160	950
24	513	1,000	590	590	1,000	772	3,210	8,520	8,230	5,770	1,320	900
25	513	1,000	590		950	772	3,060	8,760	7,450	5,230	1,210	852
26	513	950	590		900	735	3,060	9,030	7,200	4,690	1,100	804
27	513	900	590	590	852	735	3,060	9,840	7,200	4,300	1,100	714
28	513	900	590		852	735	2,920	9,840	7,450	3,740	1,100	714
29	513	804	590		.....	772	2,640	9,300	7,200	3,390	1,100	714
30	513	804	550		.....	772	2,640	9,300	7,970	2,910	1,210	714
31	476	.....	590		.....	810	.....	10,100	.....	2,760	1,050	.....

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Daily discharge, in second-feet, of Wenatchee River near Leavenworth, Wash., for the period Nov. 27, 1910, to Nov. 30, 1913—Continued.

Day.	Oct.	Nov.	Day.	Oct.	Nov.	Day.	Oct.	Nov.
1913.			1913.			1913.		
1	672	1,100	11	1,430	1,000	21	1,550	1,640
2	672	1,000	12	1,920	950	22	1,550	1,550
3	651	950	13	1,920	925	23	1,550	1,460
4	630	900	14	1,920	900	24	1,550	1,520
5	630	950	15	1,670	852	25	1,670	1,520
6	590	1,100	16	1,670	1,050	26	1,550	1,520
7	630	1,050	17	1,430	2,140	27	1,440	1,520
8	630	1,000	18	1,380	2,010	28	1,320	1,460
9	672	1,000	19	1,490	2,010	29	1,320	1,400
10	672	1,000	20	1,490	1,760	30	1,160	1,400
						31	1,100	.....

NOTE.—Records prior to Nov. 17, 1913, revised since publication in previous water-supply papers. Stage-discharge relation changed during high water May 1-5, 1911; shifting-control method used May 1-5. Rating curve used prior to change fairly well defined; curve used after the change well defined. Stage-discharge relation affected by ice Jan. 1-5, 1912, and Jan. 20-22, 25-31, Feb. 1-8, 10, 11, 13, 1913; discharge estimated by comparison with record of flow at Dryden and by interpolation. Stage-discharge relation affected by logs on control Mar. 17 to May 24, 1913; daily discharge ascertained from fairly well defined rating curve. Discharge interpolated for days when gage was not read. Revised records good prior to shift in May, 1911, and for months during which stage-discharge relation was affected by ice or logs on control; excellent for remainder of period.

Daily discharge, in second-feet, of Wenatchee River near Leavenworth, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	580	412	660	15,400	1,420	930	1,790	5,330	4,900	4,300	1,540	835
2	700	418	620	13,800	1,300	880	1,660	6,000	4,490	3,920	1,660	790
3	745	457	620	10,400	1,300	880	1,660	6,710	4,110	3,740	1,660	790
4	745	700	620	8,490	1,360	880	1,660	7,710	3,920	3,390	1,420	745
5	700	745	580	7,710	1,420	835	1,660	7,710	4,490	3,390	1,300	700
6	700	790	580	6,230	1,480	835	1,660	6,470	5,770	3,230	1,300	700
7	660	790	540	5,330	1,480	835	1,790	5,550	7,200	3,230	1,300	660
8	620	700	505	4,690	1,360	790	1,920	5,110	8,230	3,230	1,190	660
9	580	620	540	4,110	1,300	790	2,050	4,490	8,490	3,390	1,080	660
10	580	620	580	3,390	1,660	790	2,320	4,110	9,840	3,740	1,080	660
11	540	580	660	3,230	1,540	790	2,610	4,110	9,840	3,740	1,080	660
12	540	620	620	3,070	1,540	790	2,760	4,490	9,300	3,390	1,080	700
13	505	620	700	2,610	1,480	790	2,760	4,900	10,100	2,760	1,030	700
14	505	580	2,180	2,610	1,360	745	2,610	5,770	11,000	2,610	1,080	660
15	505	540	2,320	2,320	1,300	745	2,460	6,000	8,490	3,390	980	700
16	470	540	2,460	2,180	1,360	745	2,320	5,770	6,710	3,390	1,030	660
17	464	505	2,610	2,180	1,190	790	2,180	5,330	6,710	3,230	980	660
18	444	505	6,000	2,180	1,190	790	1,920	4,900	6,710	3,070	930	660
19	431	470	8,760	1,920	1,140	790	2,460	4,490	6,000	2,910	930	660
20	418	470	6,230	1,790	980	835	2,460	3,920	6,710	2,610	980	620
21	405	1,140	5,330	1,660	930	980	3,390	3,390	6,710	2,180	980	620
22	418	1,140	3,740	1,660	930	1,080	4,110	3,390	7,200	1,920	835	660
23	405	1,030	3,230	1,660	1,030	1,080	4,490	3,390	7,200	1,920	880	580
24	405	930	2,610	1,920	1,030	1,140	4,490	3,390	6,950	1,790	980	540
25	405	835	2,320	1,920	980	1,300	4,490	3,070	6,230	1,790	930	505
26	457	835	2,050	1,790	980	1,300	4,490	2,760	5,770	1,660	930	505
27	438	700	3,070	1,660	980	1,300	4,110	2,910	5,550	1,660	880	505
28	424	700	5,770	1,660	930	1,300	4,490	3,230	4,900	1,540	835	505
29	418	660	12,600	1,660	.....	1,300	4,490	3,740	4,110	1,540	790	540
30	405	700	18,700	1,540	.....	1,420	5,110	5,110	4,110	1,660	790	580
31	405	.....	14,900	1,300	.....	1,790	.....	5,770	.....	1,540	790	.....

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Monthly discharge of Wenatchee River near Leavenworth, Wash., for the period Dec. 1, 1910, to Sept. 30, 1914.

[Drainage area, 591 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1910-11.						
December	2,080	970	1,240	2.10	2.42	76,200
January	1,140	708	876	1.48	1.71	53,900
February	756	468	591	1.00	1.04	32,300
March	2,080	468	950	1.61	1.86	58,400
April	4,530	1,810	2,540	4.30	4.80	151,000
May	7,200	3,070	4,210	7.12	8.21	259,000
June	10,400	3,560	6,220	10.5	11.71	370,000
July	3,740	1,550	2,720	4.60	5.30	167,000
August	1,430	714	951	1.61	1.86	58,400
September	1,210	476	756	1.28	1.43	45,000
The period	.....	.....	.....	.....	.....	1,270,000
1911-12.						
October	476	340	400	.677	.78	24,600
November	4,300	335	1,310	2.22	2.48	78,000
December	1,380	630	890	1.51	1.74	54,700
January	1,050	.....	732	1.24	1.43	45,000
February	900	672	785	1.33	1.43	45,200
March	1,260	513	662	1.12	1.29	40,700
April	3,230	1,430	2,330	3.94	4.40	139,000
May	11,500	3,230	6,760	11.4	13.14	416,000
June	8,760	4,110	6,690	11.3	12.61	398,000
July	4,110	1,380	2,600	4.40	5.07	160,000
August	1,550	714	1,070	1.81	2.09	65,800
September	950	442	602	1.02	1.14	35,800
The year	11,500	335	2,070	3.50	47.60	1,500,000
1912-13.						
October	590	402	483	.817	.94	29,700
November	1,050	476	733	1.24	1.38	43,600
December	1,000	550	698	1.18	1.36	42,900
January	852	.....	621	1.05	1.21	38,200
February	1,320	.....	809	1.37	1.43	44,900
March	900	735	815	1.38	1.59	50,100
April	4,160	772	2,140	3.62	4.04	127,000
May	10,100	2,380	5,990	10.1	11.64	368,000
June	14,300	6,710	9,570	16.2	18.07	569,000
July	7,970	2,760	5,260	8.90	10.26	323,000
August	3,070	1,050	1,700	2.88	3.32	105,000
September	2,760	714	1,130	1.91	2.13	67,200
The year	14,300	402	2,500	4.23	57.37	1,810,000
1913-14.						
October	1,920	590	1,240	2.10	2.42	76,200
November	2,140	852	1,290	2.18	2.43	76,800
December	1,290	599	830	1.40	1.61	51,000
January	2,140	591	1,160	1.96	2.26	71,300
February	930	575	666	1.13	1.18	37,000
March	2,540	817	1,510	2.55	2.94	92,800
April	5,700	1,350	3,410	5.77	6.44	203,000
May	8,560	3,510	5,920	10.0	11.53	364,000
June	7,760	2,970	4,560	7.72	8.61	271,000
July	4,700	1,370	2,760	4.67	5.38	170,000
August	1,400	700	981	1.66	1.91	60,300
September	1,080	482	710	1.20	1.34	42,300
The year	8,560	482	2,090	3.54	48.05	1,520,000

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Monthly discharge of Wenatchee River near Leavenworth, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 591 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	745	405	517	0.875	1.00	31,800
November	1,140	412	678	1.15	1.28	40,300
December	18,700	505	3,640	6.16	7.10	224,000
January	15,400	1,300	3,940	6.67	7.69	242,000
February	1,660	930	1,250	2.12	2.21	69,400
March	1,790	745	976	1.65	1.90	60,000
April	5,110	1,660	2,880	4.87	5.43	171,000
May	7,710	2,760	4,810	8.14	9.38	296,000
June	11,000	3,920	6,720	11.4	12.72	400,000
July	4,300	1,540	2,770	4.69	5.41	170,000
August	1,660	790	1,070	1.81	2.09	65,800
September	835	505	647	1.09	1.22	38,500
The year	18,700	405	2,500	4.23	57.43	1,810,000

YAKIMA RIVER BASIN.

KEECHELUS LAKE NEAR MARTIN, WASH.

LOCATION.—At outlet of lake, 1¼ miles northeast of Meadow Creek station on Chicago, Milwaukee & St. Paul Railway, 3½ miles northwest of Martin, Kittitas County, and 9½ miles northwest of Easton.

DRAINAGE AREA.—55 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 12, 1906, to September 30, 1918.

GAGE.—Vertical staff attached to pier of gate house bridge; read by A. L. Flint. Position of gage changed frequently during 1914 and 1915 to accommodate work on construction of new dam. Since August 19, 1914, gages have been set to sea-level datum; prior to that date at height of gate sill in temporary crib dam—elevation, 2,457 feet.

EXTREMES OF STAGE.—Maximum stage recorded during the year, 2,490.66 feet on July 10 (contents, 97,410 acre-feet); minimum stage recorded, 2,431.24 feet on September 30 (contents, 7,820 acre-feet).

1906-1918: Maximum and minimum stages recorded in 1918.

STORAGE.—Capacity of new reservoir, 152,000 acre-feet; elevation of gate sill, 2,425 feet, and of spillway crest, 2,515 feet. Record of storage or release each month used to determine discharge without storage for gaging station below dam.

COOPERATION.—Records furnished by United States Reclamation Service.

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Daily contents, in acre-feet, of Keechelus Lake near Martin, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1...	53,710	57,780	20,110	68,000	32,100	44,160	54,010	70,660	95,810	96,430	90,900	16,570
2...	53,860	57,970	18,670	67,800	32,460	44,430	54,540	72,050	95,380	96,650	87,780	16,010
3...	54,020	58,200	17,600	66,620	33,010	44,650	55,000	73,860	94,940	96,910	84,820	15,520
4...	54,160	58,700	16,700	65,970	33,440	44,880	55,480	76,130	94,640	97,010	81,810	15,050
5...	54,290	59,070	15,810	65,350	34,000	45,060	55,930	78,030	94,780	97,090	79,150	14,650
6...	54,420	59,390	15,090	64,290	34,650	45,280	56,360	79,430	95,340	97,150	76,890	14,640
7...	54,510	59,620	14,510	63,330	35,250	45,480	56,810	80,540	96,170	97,170	74,880	13,970
8...	54,620	59,840	14,660	62,090	35,790	45,680	57,330	81,540	96,870	97,250	72,820	13,240
9...	54,750	60,040	14,880	60,400	36,270	45,900	57,980	82,340	96,970	97,330	69,910	12,650
10...	54,870	60,210,	15,190	58,360	37,030	46,130	58,820	83,090	97,250	97,410	66,720	12,140
11...	54,960	60,370	15,770	56,330	37,880	46,300	59,760	83,860	97,050	97,370	63,580	11,740
12...	55,050	60,556	16,550	54,450	38,550	46,500	60,650	84,820	96,770	97,250	60,460	11,380
13...	55,170	59,190	18,570	52,440	39,150	46,700	61,520	85,910	96,650	97,090	57,330	11,100
14...	55,240	57,570	27,000	50,330	39,620	46,840	62,250	87,140	96,730	96,970	54,080	10,850
15...	55,320	55,640	31,080	48,440	40,070	47,010	62,980	88,270	96,810	96,850	51,040	10,500
16...	55,390	53,540	34,170	46,180	40,480	47,180	63,330	89,300	96,770	96,810	47,950	10,240
17...	55,460	51,050	37,920	43,950	40,910	47,410	62,910	90,360	96,750	96,710	44,820	9,980
18...	55,540	48,500	48,480	41,790	41,240	47,640	62,720	91,400	96,690	96,570	41,760	9,730
19...	55,610	45,620	53,850	39,530	41,540	47,870	62,710	92,390	96,670	96,450	38,960	9,490
20...	55,730	42,760	53,830	37,190	41,790	48,140	62,980	93,290	96,770	96,170	36,200	9,280
21...	55,870	40,300	52,600	34,920	42,070	48,400	63,680	94,030	96,930	96,090	33,650	9,100
22...	55,940	39,620	52,220	32,900	42,350	48,840	64,160	94,700	97,130	95,890	31,200	8,930
23...	56,030	37,240	51,920	31,190	42,710	49,270	64,160	95,340	97,170	95,690	28,920	8,760
24...	56,240	34,750	50,680	30,510	43,010	49,700	64,380	95,730	96,970	95,500	26,770	8,610
25...	56,450	32,060	48,950	30,470	43,290	50,160	64,770	95,930	96,650	95,300	24,790	8,410
26...	56,720	29,590	47,300	30,110	43,330	50,630	65,360	96,010	96,370	95,100	23,060	8,270
27...	57,010	27,330	48,110	29,790	43,680	51,080	65,970	96,050	96,170	94,860	21,470	8,130
28...	57,190	25,210	51,840	29,860	43,940	51,580	66,980	96,130	96,170	94,620	20,130	8,030
29...	57,360	23,390	59,580	30,550	.....	52,010	67,960	96,130	96,210	94,430	18,980	7,900
30...	57,510	21,760	64,450	31,080	.....	52,570	69,310	96,170	96,330	94,190	17,980	7,820
31...	57,640	.....	65,320	31,750	.....	53,330	.....	96,090	.....	93,510	17,220	.....

YAKIMA RIVER NEAR MARTIN, WASH.

LOCATION.—Below dam at outlet of Keechelus Lake, 1½ miles east of Meadow Creek station on Chicago, Milwaukee & St. Paul Railway, 3½ miles northwest of Martin, and 9½ miles northwest of Easton, Kittitas County.

DRAINAGE AREA.—55 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 18 to November 14, 1903; January 28, 1904, to September 30, 1918.

GAGE.—Inclined staff gage in paved section on left side of outlet works, installed December 2, 1916; read by A. L. Flint. Previous gage vertical staff just above cable, 1¼ miles below dam, installed May 4, 1915. For description of former gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable 1¼ miles below dam or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; shifts at high stages. Logs and brush sometimes lodge on riffle control below gage and cause backwater, affecting stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.2 feet August 9 to 16 (discharge, 1,840 second-feet); minimum stage, no flow October 8 to November 6, and December 10–16, when reservoir gates were closed.

1904–1918: Maximum discharge, 7,370 second-feet at 10.45 a. m. March 26, 1915, when temporary crib dam was washed out (gage destroyed; discharge computed from hourly gage readings of lake surface and estimated natural inflow to lake); practically no flow when gates in Keechelus reservoir dam are closed.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

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REGULATION.—Flow partly controlled by storage and release of water at Keechelus reservoir. Monthly discharge without storage determined from records of stage at reservoir.

ACCURACY.—Stage-discharge relation not permament. Rating curves for period October 1 to December 31, fairly well defined except for extreme low water; curves for remainder of year well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—United States Reclamation Service furnished field data and rating tables.

Discharge measurements of Yakima River near Martin, Wash., during the year ending Sept. 30, 1918.

[Made by F. E. Moxley.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 16	7.89	1,180	Jan. 12	8.73	1,500
21	8.73	1,530	May 17	2.47	45
21	7.10	919	June 12	7.70	1,120
22	4.50	308	July 16	3.82	199
22	6.00	599	Aug. 6	7.46	1,120

Daily discharge, in second-feet, of Yakima River near Martin, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1	.....	860	1,800	9	5	5	24	710	220	1,600	434
2	1	.....	755	1,800	9	5	5	26	606	78	1,680	379
3	1	.....	653	1,800	9	5	5	28	553	120	1,680	338
4	1	.....	576	1,760	9	5	5	31	553	167	1,680	348
5	1	.....	520	1,760	9	5	5	32	553	167	1,440	187
6	1	.....	467	1,760	9	5	5	33	553	167	1,180	232
7	1	1	157	1,720	9	5	5	35	609	167	1,220	534
8	.....	1	3	1,720	9	5	5	36	800	167	1,430	446
9	.....	1	1	1,680	9	5	5	36	890	167	1,840	379
10	.....	1	.....	1,640	9	5	5	37	1,050	186	1,840	328
11	.....	1	.....	1,640	9	5	6	38	1,130	204	1,840	281
12	.....	502	.....	1,600	9	5	8	38	1,130	204	1,840	244
13	.....	860	.....	1,600	9	5	11	38	1,060	204	1,840	220
14	.....	963	.....	1,520	9	5	14	39	553	204	1,840	228
15	.....	1,130	.....	1,520	9	5	15	39	553	204	1,840	228
16	.....	1,320	.....	1,520	9	4	330	39	553	204	1,840	212
17	.....	1,400	276	1,520	9	4	451	43	553	204	1,800	212
18	.....	1,490	951	1,480	9	4	342	45	553	204	1,760	189
19	.....	1,560	1,400	1,480	8	4	292	46	427	204	1,680	175
20	.....	1,520	1,440	1,400	8	4	188	46	427	204	1,600	165
21	.....	918	1,440	1,320	7	4	308	46	427	204	1,520	160
22	.....	638	1,440	1,200	7	4	683	47	467	204	1,440	146
23	.....	1,400	1,440	1,020	6	4	770	109	531	204	1,370	143
24	.....	1,440	1,400	890	6	4	553	235	553	204	1,260	145
25	.....	1,400	1,400	769	6	4	314	292	531	204	1,150	143
26	.....	1,320	1,400	653	6	4	244	292	509	204	1,050	135
27	.....	1,240	1,480	500	5	4	98	324	383	204	945	127
28	.....	1,160	1,560	184	5	4	22	390	509	204	817	122
29	.....	1,020	1,680	10	.....	5	23	588	237	204	712	114
30	.....	955	1,720	9	.....	5	24	830	221	204	586	107
31	.....	.....	1,760	9	.....	5	.....	867	.....	947	508	.....

NOTE.—No flow Oct. 8 to Nov. 6, Dec. 10-16; water being stored in Keechelus Lake.

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Monthly discharge of Yakima River near Martin, Wash., for year ending Sept. 30, 1918.

[Drainage area, 55 square miles.]

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
October	1	0	0.23	14.1	+ 4,050	4,060	66.0	1.20	1.38
November	1,560	0	741	44,100	−35,900	8,200	138	2.51	2.80
December	1,760	0	799	49,100	+43,600	92,700	1,510	27.5	31.70
January	1,800	9	1,270	78,100	−33,600	44,500	724	13.2	15.22
February	9	5	8.07	448	+12,200	12,600	227	4.13	4.30
March	5	4	4.58	282	+ 9,390	9,670	157	2.85	3.29
April	770	5	158	9,400	+16,000	25,400	427	7.76	8.66
May	867	24	153	9,410	+26,800	36,200	589	10.7	12.34
June	1,130	221	606	36,100	+ 240	36,300	610	11.1	12.38
July	947	78	214	13,200	− 2,820	10,400	169	3.07	3.54
August	1,840	508	1,450	89,200	−76,300	12,900	210	3.82	4.40
September	534	107	237	14,100	− 9,400	4,700	79.0	1.44	1.61
The year	1,840	0	474	343,000	−45,800	298,000	411	7.47	101.62

YAKIMA RIVER AT CLE ELUM, WASH.

LOCATION.—In sec. 27, T. 20 N., R. 15 E., at highway bridge at Cle Elum, Kittitas County, just above Roslyn Creek, 3 miles below mouth of Cle Elum River, and 6½ miles above Teanaway River.

DRAINAGE AREA.—500 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 24, 1906, to September 30, 1918.

GAGE.—Friez water-stage recorder referred to staff gage on right bank under highway bridge; installed July 12, 1911; inspected by T. J. Denny. For description of previous gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and cobblestones; somewhat shifting. One channel at all stages. Control at low water formed by broad riffle about 1,200 feet below gage; at high water by a section of stream bed extending about one-fourth mile below gage; shifting during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 11.0 feet at 12.30 a. m. December 30 (discharge, 19,900 second-feet); minimum stage, from recorder, 1.47 feet November 7 (discharge, 286 second-feet).

1906–1918: Maximum stage, measured from high-water marks, 12.5 feet November 14, 1906 (discharge about 25,600 second-feet); minimum stage recorded, 1.11 feet at 6 p. m. September 30, 1915 (discharge, 192 second-feet).

ICE.—Stage-discharge relation not affected by ice during current year.

DIVERSIONS.—None.

REGULATION.—Flow partly regulated by storage and release of water at Keechelus, Kachess, and Cle Elum reservoirs. Monthly discharge without storage determined from records of stage at reservoirs.

ACCURACY.—Stage-discharge relation changing October 1 to December 30; permanent thereafter. Rating curves fairly well defined prior to December 30; curve for remainder of year well defined. Water-stage recorder inspected and staff gage read twice daily. Operation satisfactory. Daily discharge ascertained by applying to rating table daily gage height ascertained by inspection of recorder graph; shifting-control method used October 1 to December 18. Records good for period October to December; excellent for period January to September.

COOPERATION.—United States Reclamation Service furnished field data and rating tables.

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Discharge measurements of Yakima River at Cle Elum, Wash., during the year ending Sept. 30, 1918.

[Made by F. E. Moxley.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 8	1.99	542	Apr. 3	2.89	1,470
Nov. 15	2.90	1,140	May 16	4.61	3,760
Dec. 26	4.75	3,790	June 10	5.96	6,430
Jan. 10	5.53	5,540	July 15	3.07	1,700
Feb. 7	2.20	863	Aug. 5	3.60	2,330

Daily discharge, in second-feet, of Yakima River at Cle Elum, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	726	417	1,060	13,000	1,600	691	1,600	4,290	4,480	2,000	2,260	1,820
2	726	388	1,020	11,100	1,660	665	1,600	4,580	3,840	1,760	2,450	1,760
3	726	323	903	8,950	1,600	659	1,490	4,970	3,430	1,600	2,380	1,710
4	694	306	853	7,920	1,550	647	1,390	5,690	3,130	1,600	2,380	1,940
5	627	294	745	7,680	1,240	629	1,340	5,900	3,360	1,820	2,320	1,940
6	614	290	694	6,970	894	593	1,290	5,270	3,840	2,000	2,260	2,000
7	632	286	781	6,750	863	582	1,290	4,380	4,670	2,120	2,190	2,060
8	546	286	774	6,530	841	565	1,340	3,930	5,480	2,120	2,190	2,120
9	526	290	719	6,110	784	560	1,440	3,510	5,900	2,260	2,380	2,000
10	546	286	694	5,690	956	554	1,600	3,060	6,320	2,380	2,580	1,940
11	551	298	706	5,270	1,240	554	2,060	2,780	6,530	2,120	2,580	1,880
12	687	358	910	5,070	1,290	549	2,260	2,710	6,320	1,880	2,580	1,820
13	1,000	745	1,380	5,480	1,290	532	2,260	3,060	6,320	1,760	2,580	1,760
14	1,180	984	2,960	5,070	1,240	527	2,060	3,510	6,110	1,710	2,520	1,710
15	1,180	1,140	2,470	4,970	1,170	527	1,940	3,930	5,070	1,760	2,520	1,710
16	1,140	1,260	2,960	4,870	1,120	532	1,880	3,760	4,200	2,260	2,520	1,710
17	1,100	1,420	4,600	4,770	1,040	565	2,120	3,510	3,840	2,380	2,450	1,760
18	1,060	1,420	11,700	4,380	1,010	605	1,940	3,360	3,760	2,380	2,450	1,710
19	1,060	1,550	15,100	4,200	940	623	1,820	3,130	3,430	2,380	2,380	1,710
20	1,020	1,550	10,500	4,020	849	653	1,940	2,850	3,200	2,320	2,260	1,660
21	947	1,500	7,160	3,760	805	697	2,450	2,640	3,130	2,060	2,320	1,660
22	947	871	6,010	3,760	771	757	3,510	2,450	3,280	1,940	2,260	1,600
23	903	1,200	5,790	3,590	777	820	4,380	2,320	3,510	2,000	2,190	1,600
24	903	1,460	4,930	3,930	757	863	4,380	2,260	3,590	1,940	2,320	1,440
25	687	1,500	4,330	3,760	737	925	4,020	2,320	3,430	1,880	2,260	1,100
26	614	1,460	4,050	2,780	784	1,020	3,510	2,260	3,130	2,000	2,060	1,020
27	524	1,380	5,140	2,450	737	1,060	3,510	2,060	2,850	2,060	2,000	989
28	487	1,340	9,470	2,190	717	1,060	3,360	2,190	2,580	2,000	2,000	997
29	446	1,260	16,500	1,940	.....	1,070	3,510	2,640	2,320	1,940	2,190	1,290
30	431	1,220	17,700	1,710	.....	1,200	3,930	3,590	2,120	2,000	1,880	1,290
31	421	.....	12,700	1,550	.....	1,490	.....	4,580	.....	2,120	1,820	.....

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Monthly discharge of Yakima River at Cle Elum, Wash., for year ending Sept. 30, 1918.

[Drainage area, 500 square miles.]

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
October	1,180	421	763	46,900	− 25,000	21,900	356	0.712	0.82
November	1,550	286	903	53,700	− 24,500	29,200	491	.982	1.10
December	17,700	649	5,010	308,000	+139,000	447,000	7,270	14.5	16.72
January	13,000	1,550	5,170	318,000	− 34,800	283,000	4,610	9.22	10.63
February	1,660	717	1,050	58,300	+ 27,700	86,000	1,550	3.10	3.23
March	1,490	527	735	45,200	+ 19,600	64,800	1,050	2.10	2.42
April	4,380	1,290	2,370	141,000	+ 38,600	180,000	3,020	6.04	6.74
May	5,900	2,060	3,470	213,000	+ 28,700	242,000	3,940	7.88	9.08
June	6,530	2,120	4,110	245,000	− 1,250	244,000	4,100	8.20	9.15
July	2,380	1,600	2,020	124,000	− 47,900	76,100	1,240	2.48	2.86
August	2,580	1,820	2,310	142,000	− 99,500	42,500	691	1.38	1.59
September	2,120	989	1,660	98,800	− 77,400	21,400	360	.720	.80
The year	17,700	286	2,480	1,790,000	− 53,800	1,740,000	2,400	4.80	65.14

YAKIMA RIVER AT UMTANUM, WASH.

LOCATION.—In sec. 30, T. 16 N., R. 19 E., at Umtanum, Kittitas County, half a mile above Umtanum Creek and 10 miles south of Ellensburg.

DRAINAGE AREA.—1,620 square miles (measured on topographic maps and Plate I, Water-Supply Paper 369).

RECORDS AVAILABLE.—August 25, 1906, to May 20, 1907; August 10, 1907, to November 15, 1915; irrigation seasons, 1916 to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank 100 feet east of Northern Pacific Railway section house at Umtanum, installed July 10, 1914; inspected by Tom Letos and G. F. Sterling. For descriptions of previous gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable 100 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of rocks and gravel; slightly shifting. No well-defined control. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.00 feet 9 a. m. to 6 p. m. May 5 (discharge, 7,740 second-feet); minimum stage recorded, 3.47 feet at noon November 5 (discharge, 493 second-feet).

1906–1918: Maximum stage recorded, 14.2 feet November 15 or 16, 1906 (estimated from high-water marks; discharge, about 41,000 second-feet); minimum stage recorded, 2.86 feet at 7 p. m. October 3, 1915 (discharge, 138 second-feet).

ICE.—Record discontinued during winter.

DIVERSIONS.—Water diverted above gage for irrigation of about 40,000 acres in Kittitas Valley.

REGULATION.—Flow partly regulated by storage and release of water at Keechelus, Kachess, and Cle Elum reservoirs.

ACCURACY.—Stage-discharge relation for stages below 6.0 feet changed slightly during winter. Rating curves well defined. Water-stage recorder inspected, and staff gage read to hundredths twice daily. Operation of recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of recorder graph. Records excellent.

COOPERATION.—United States Reclamation Service furnished field data.

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Discharge measurements of Yakima River at Umtanum, Wash., during the year ending Sept. 30, 1918.

[Made by F. E. Moxley.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 5	3.64	640	July 18	4.89	2,210
Apr. 1	5.55	3,600	Aug. 8	4.73	1,870
July 3	4.55	1,680			

Daily discharge, in second-feet, of Yakima River at Umtanum, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	705	601	3,600	5,590	5,310	2,180	1,900	1,620
2	686	601	3,360	5,880	4,760	1,970	1,990	1,600
3	667	563	3,030	6,330	4,230	1,660	2,150	1,550
4	696	518	2,820	7,100	3,720	1,490	2,150	1,560
5	648	501	2,720	7,580	3,600	1,530	2,130	1,620
6	610	536	2,610	7,100	4,230	1,700	2,040	1,660
7	592	563	2,610	6,030	5,030	1,820	1,970	1,680
8	620	563	2,720	5,450	6,030	1,900	1,940	1,820
9	610	563	2,820	5,310	6,640	2,010	1,970	1,840
10	563	563	3,250	4,490	6,940	2,240	2,180	1,790
11	536	563	3,720	4,100	7,420	2,200	2,300	1,730
12	545	563	4,100	3,720	7,260	2,010	2,320	1,650
13	610	563	4,230	3,840	7,100	1,790	2,330	1,560
14	933	.....	3,840	4,490	7,100	1,700	2,280	1,560
15	1,030	.....	3,480	5,170	6,330	1,600	2,280	1,490
16	1,070	.....	3,250	5,310	5,170	1,770	2,410	1,480
17	1,080	.....	3,140	4,900	4,490	2,040	2,410	1,500
18	1,070	.....	3,140	4,620	4,230	2,200	2,390	1,520
19	1,030	.....	2,920	4,360	4,100	2,200	2,300	1,480
20	1,050	.....	3,030	3,970	3,600	2,180	2,180	1,460
21	1,060	.....	3,720	3,480	3,480	2,060	2,110	1,450
22	1,030	.....	5,030	3,250	3,480	1,810	2,130	1,450
23	1,030	.....	6,330	3,030	3,720	1,740	2,090	1,490
24	1,020	.....	6,640	2,820	3,970	1,890	2,080	1,480
25	977	.....	6,330	2,720	3,840	1,850	2,060	1,330
26	890	.....	5,310	2,720	3,480	1,810	1,960	1,110
27	820	.....	4,900	2,510	3,250	1,840	1,770	1,060
28	762	.....	4,760	2,410	2,820	1,820	1,770	974
29	705	.....	4,760	2,610	2,610	1,810	1,870	1,030
30	658	.....	5,170	3,480	2,370	1,760	1,770	1,210
31	638	.....	.....	4,000	.....	1,790	1,660	.....

Monthly discharge of Yakima River at Umtanum, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,080	536	805	49,500
November 1-13	601	501	559	14,400
April	6,640	2,610	3,910	233,000
May	7,580	2,410	4,490	276,000
June	7,420	2,370	4,680	278,000
July	2,240	1,490	1,880	116,000
August	2,410	1,660	2,090	129,000
September	1,840	974	1,490	88,700

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YAKIMA RIVER NEAR PARKER, WASH.

LOCATION.—In sec. 28, T. 12 N., R. 19 E., below Sunnyside diversion dam, 2 miles below Union Gap, 1½ miles east of Parker, Yakima County, 3½ miles northwest of Wapato, and 11 miles below mouth of Naches River.

DRAINAGE AREA.—3,560 square miles (measured on topographic maps and Plate I of Water-Supply Paper 369).

RECORDS AVAILABLE.—April 25, 1908, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank about 600 feet below Sunnyside diversion dam, installed August 17, 1915; inspected by Henry Hanson. For description of previous gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable 80 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of solid rock, large boulders, and gravel; somewhat shifting. Control formed by diagonal riffle just below Oregon-Washington Railroad & Navigation Co.'s bridge and about 250 feet below gage; may shift slightly during extremely high floods; supports of railway bridge form part control at high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 15.0 feet at 1 p. m. December 30 (discharge, 52,900 second-feet); minimum stage recorded, 1.12 feet at 6 a. m. September 14 (discharge, zero).

1908–1918: Maximum stage recorded above. Minimum discharge recorded, zero in 1918, October 26, 1911 (gage height −0.65 foot) and August 25, 28, 1915 (gage height, 1.12 feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Water diverted above gage for irrigation of about 250,000 acres.

REGULATION.—Flow partly regulated by diversions, and by storage and release of water at Keechelus, Kachess, Cle Elum, and Bumping reservoirs.

ACCURACY.—Stage-discharge relation changed December 18. Rating curves well defined. Water-stage recorder inspected and staff gage read twice daily; operation of recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height ascertained by inspection of recorder graph. Records excellent.

COOPERATION.—United States Reclamation Service furnished field data and rating tables.

Discharge measurements of Yakima River near Parker, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	Moxley and Philpott	1.98	70	May 8	F. E. Moxley	5.99	5,590
Nov. 12	Philpott and Moxley	3.63	868	29	Moxley and Blair	3.73	1,510
Dec. 15	F. E. Moxley	6.80	6,400	June 28	Moxley and Skillin	4.29	2,280
28	do	10.02	21,700	July 5	F. E. Moxley	1.84	112
29	do	12.19	33,700	July 11	do	3.11	823
Feb. 4	do	5.62	4,800	26	do	2.19	247
Apr. 6	do	5.28	4,020				

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Daily discharge, in second-feet, of Yakima River near Parker, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	104	995	1,940	35,600	4,050	2,810	5,450	5,330	5,330	1,120	315	26
2	128	1,010	1,700	33,800	4,650	2,810	5,220	5,690	4,650	855	507	12
3	131	986	1,700	25,600	4,650	2,810	4,760	6,320	3,860	591	684	16
4	122	1,050	1,580	22,600	4,650	2,810	4,440	7,740	3,320	239	519	7
5	112	1,040	1,530	20,600	4,870	2,650	4,240	8,360	3,500	104	441	40
6	66	995	1,480	19,100	4,870	2,570	4,050	7,590	4,440	98	373	117
7	41	951	1,390	19,100	4,760	2,490	4,050	6,590	6,060	174	326	76
8	12	857	1,350	18,100	4,340	2,650	4,050	5,690	7,740	315	295	92
9	19	874	1,480	16,600	4,050	2,650	4,140	5,570	8,360	331	290	186
10	8	942	1,480	14,600	4,050	2,570	4,650	4,540	9,000	810	558	174
11	5	916	1,400	13,200	4,440	2,650	5,330	3,680	9,680	810	545	162
12	28	977	1,580	12,400	4,440	2,650	5,690	3,320	9,340	647	545	197
13	16	968	1,760	12,000	4,440	2,490	5,690	3,680	9,680	346	552	47
14	160	1,010	3,150	11,600	4,240	2,330	5,220	4,980	9,680	373	507	8
15	639	1,410	6,040	10,800	4,050	2,330	4,650	6,460	8,050	84	482	148
16	770	1,530	4,660	10,000	4,050	2,330	4,240	6,060	5,940	65	545	137
17	778	1,700	5,330	9,340	3,860	2,490	3,770	5,330	5,100	532	647	170
18	725	1,880	11,800	8,680	3,770	2,650	3,500	4,760	4,760	598	654	231
19	770	1,940	36,800	8,360	3,500	2,730	3,240	4,340	4,340	640	626	87
20	801	2,000	33,200	8,360	3,150	2,810	3,240	3,860	3,860	692	558	272
21	865	2,060	21,100	7,740	3,060	2,650	3,960	3,150	3,680	571	526	248
22	865	2,060	16,600	7,440	3,150	2,650	5,450	2,730	3,860	357	558	235
23	899	1,640	16,100	7,590	3,320	3,060	6,870	2,330	3,960	209	412	267
24	848	1,700	13,200	8,360	3,150	3,150	7,440	2,090	4,140	384	373	357
25	874	1,880	11,200	10,000	3,150	3,500	7,010	2,010	3,770	305	435	341
26	840	2,000	10,000	8,360	2,980	3,860	5,810	1,890	3,320	257	406	186
27	809	2,000	11,200	6,870	2,980	3,860	4,980	1,940	2,730	276	276	197
28	770	1,940	19,600	6,320	2,810	3,680	4,540	1,650	2,170	231	197	320
29	718	2,000	34,400	6,060	.....	3,500	4,540	1,650	1,790	239	214	470
30	653	1,940	50,100	5,450	.....	3,860	4,870	2,810	1,450	159	464	495
31	725	.....	41,000	4,650	.....	4,870	.....	4,650	.....	124	137	.....

Monthly discharge of Yakima River near Parker, Wash., New Reservation, Old Reservation, and Sunnyside canals, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.							Run-off in acre-feet.	
	River.			New Reservation canal (mean).	Old Reservation canal (mean).	Sunnyside canal (mean).	Total mean.[a]	River.	Total.[a]
	Maximum.	Minimum.	Mean.						
October	899	5	461	94.9	35.9	562	1,150	28,300	70,700
November	2,060	857	1,440	.....	.....	6.67	1,450	85,700	86,300
December	50,100	1,350	11,800	.....	.....	.....	11,800	726,000	726,000
January	35,600	4,650	13,200	.....	.....	.....	13,200	812,000	812,000
February	4,870	2,810	3,910	.....	.....	.....	3,910	217,000	217,000
March	4,870	2,330	2,930	.....	.....	93.1	3,020	180,000	186,000
April	7,440	3,240	4,840	245	134	749	5,970	288,000	355,000
May	8,360	1,650	4,410	803	267	1,160	6,640	271,000	408,000
June	9,680	1,450	5,250	939	289	1,140	7,620	312,000	453,000
July	1,120	65	404	813	174	1,190	2,580	24,800	159,000
August	684	137	451	693	168	1,160	2,470	27,700	152,000
September	495	7	177	535	113	946	1,770	10,500	105,000
The year	50,100	5	4,120	.....	.....	.....	5,150	2,980,000	3,730,000

[a] Totals are comparable with monthly values previously determined for Yakima River at Union Gap, near Yakima, Wash.

NOTE.—For records of flow of the three canals see pp. 155-160.

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YAKIMA RIVER NEAR PROSSER, WASH.

LOCATION.—In SE. ¼ sec. 36, T. 9 N., R. 24 E., 1¼ miles northeast of Prosser, Benton County, and 40 miles above mouth.

DRAINAGE AREA.—5,340 square miles (measured on project map of United States Reclamation Service).

RECORDS AVAILABLE.—June 1 to October 10, 1904; June 8 to December 30, 1905; February 1 to October 12, 1906; August 4, 1913, to October 31, 1915; irrigation seasons 1916 to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank, 1¼ miles below Prosser Falls, installed August 4, 1913; inspected by T. Martinson. June 1, 1904, to December 30, 1905, chain gage on highway bridge 600 feet below Prosser Falls. February 1 to October 12, 1906, inclined staff at approximately same site as present gage but at different datum.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above gage or from boat.

CHANNEL AND CONTROL.—Bed composed of rock and large boulders; changes only during floods. Control formed by broad riffle about 800 feet below gage; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.60 feet at 1 p. m. June 12 (discharge, 10,000 second-feet); minimum stage recorded, 1.40 feet at 9 a. m. October 12 (discharge, 484 second-feet).

1904–1906 and 1914–1918: Maximum flow measured by floats (not referred to gage) at 3 p. m. November 17, 1906 (discharge, 62,800 second-feet); maximum stage occurred at 9 a. m. on same date at stage three-fourths inch above that of measurement; minimum stage recorded, 2.60 feet August 19, 26, 30, 31, and September 30, 1906 (discharge, about 40 second-feet).

ICE.—Record discontinued during winter.

DIVERSIONS.—Water diverted above gage for irrigation of about 250,000 acres.

REGULATION.—Flow partly regulated by diversions and by storage and release of water of Keechelus, Kachess, Cle Elum, and Bumping reservoirs.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Water-stage recorder inspected once daily; operation satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of recorder graph. Records excellent.

COOPERATION.—United States Reclamation Service furnished field data and rating table.

Discharge measurements of Yakima River near Prosser, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 5	Philpott and Moxley	2.77	1,460	June 18	F. E. Moxley	5.68	5,670
Mar. 29	F. E. Moxley	5.02	4,380	July 8	do	1.99	790

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Daily discharge, in second-feet, of Yakima River near Prosser, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	771	5,910	5,510	4,770	2,130	796	863
2	734	6,320	5,910	5,510	1,840	777	850
3	693	5,910	6,110	4,950	1,560	830	796
4	734	5,510	6,950	4,230	1,310	927	758
5	722	5,320	8,040	3,740	1,090	949	746
6	688	4,950	8,510	3,820	942	891	722
7	645	4,770	8,040	4,770	856	877	717
8	693	4,770	6,950	6,320	796	830	699
9	665	4,770	6,530	8,040	771	809	753
10	633	4,770	6,110	8,510	856	803	746
11	633	5,320	5,130	9,510	1,050	765	753
12	563	5,910	4,500	10,000	1,170	830	722
13	654	6,320	4,060	9,510	1,220	884	728
14	612	6,320	4,230	9,770	1,050	920	823
15	592	5,910	5,710	9,770	956	906	843
16	759	5,320	6,740	8,270	836	891	843
17	994	4,770	6,320	6,740	753	913	843
18	1,090	4,410	5,710	5,710	863	1,000	843
19	1,130	4,140	5,320	5,320	1,050	1,010	850
20	1,170	3,820	4,950	4,770	1,090	1,090	891
21	1,220	3,900	4,410	4,320	1,130	1,130	898
22	1,260	4,590	3,820	4,320	1,130	1,090	898
23	1,310	6,110	3,440	4,230	1,000	1,090	884
24	1,360	7,160	3,090	4,500	956	1,050	884
25	1,260	7,590	2,820	4,500	964	1,000	920
26	1,310	7,160	2,680	4,230	1,010	1,010	964
27	1,310	6,110	2,620	3,660	920	987	1,000
28	1,220	5,510	2,620	3,230	884	964	920
29	1,220	5,320	2,430	2,820	836	906	898
30	1,170	5,130	2,250	2,430	823	877	1,010
31	1,130	.....	3,090	.....	771	920	.....

Monthly discharge of Yakima River near Prosser, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,360	563	934	57,400
April	7,590	3,820	5,460	325,000
May	8,510	2,250	4,990	307,000
June	10,000	2,430	5,740	342,000
July	2,130	753	1,050	64,600
August	1,130	765	927	57,000
September	1,010	699	835	49,700

KACHESS LAKE NEAR EASTON, WASH.

LOCATION.—In sec. 24, T. 21 N., R. 13 E. (unsurveyed), at outlet of lake, 2½ miles northwest of Easton, Kittitas County.

DRAINAGE AREA.—63 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 20, 1905, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder installed in gate tower November 25, 1915, for use when gates are closed, and staff gage in three sections (datum, mean sea level); read by I. Pennington and Fred Diener. For description of present staff gage and former gages see Water-Supply Paper 442.

EXTREMES OF STAGE.—Maximum stage recorded during year, 2,259.96 feet at 7.30 a. m. June 23 (contents, 229,780 acre-feet); minimum stage recorded, 2,225.03 feet on November 12 (contents, 91,080 acre-feet).

1906–1918: Maximum stage recorded, June 23, 1918; minimum stage recorded, 2,197.73 feet September 26–27, 1915 (contents, 13,730 acre-feet).

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STORAGE.—Capacity of reservoir at crest of spillway, 221,000 acre-feet (revised determination). Elevation of gate sill, 2,192.75 feet; and of spillway crest, 2,258.00 feet. Record of storage or release each month used for determining discharge without storage at gaging station below dam.

ACCURACY.—Water-stage recorder in gate tower, used when gates were closed; referred to staff gage once daily. When gates were open, staff gage read to hundredths twice daily.

COOPERATION.—Records furnished by United States Reclamation Service.

Daily contents, in acre-feet, of Kachess Lake near Easton, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1....	118,140	93,120	94,780	178,590	184,420	197,720	207,280	226,200	227,630	228,610	184,800	174,060
2....	117,380	92,770	94,990	181,940	185,180	197,930	207,940	226,250	227,580	228,610	184,760	172,980
3....	116,650	92,430	95,340	184,250	185,860	198,320	208,500	226,560	227,360	228,700	184,550	171,950
4....	115,930	92,360	95,900	186,360	186,400	198,400	208,890	226,740	227,090	228,700	184,290	170,140
5....	114,840	92,360	95,970	188,690	187,210	198,620	209,420	226,290	227,140	228,170	183,910	168,170
6....	114,300	92,290	96,180	190,820	188,060	198,750	209,770	225,440	227,540	227,050	183,070	165,680
7....	113,650	92,220	96,530	192,950	188,400	198,960	210,290	224,950	228,340	225,670	182,020	163,280
8....	113,140	91,940	96,600	193,600	188,910	199,140	210,820	224,600	228,660	224,240	180,970	160,900
9....	112,670	91,700	96,740	193,510	189,290	199,350	211,430	224,330	228,610	222,670	180,470	158,580
10....	112,090	91,490	96,880	193,170	190,100	199,740	212,130	224,240	228,880	221,040	180,470	156,300
11....	111,550	91,250	97,720	193,080	190,950	199,870	213,010	224,150	228,660	219,800	180,470	153,920
12....	111,040	91,080	98,280	193,000	191,720	200,040	213,980	224,420	228,340	218,910	180,180	151,640
13....	109,930	91,360	99,470	192,230	192,310	200,210	214,770	224,950	228,700	217,850	179,880	149,250
14....	108,710	91,490	101,720	191,380	192,740	200,380	215,520	225,350	229,060	217,060	179,760	146,950
15....	107,650	91,560	107,900	190,520	193,170	200,510	216,490	225,440	229,060	216,180	179,720	144,540
16....	106,330	91,740	110,150	189,500	193,600	200,640	217,060	225,310	228,880	214,150	179,460	142,040
17....	105,150	91,840	113,210	188,480	194,070	200,820	217,410	225,040	228,930	212,130	179,300	139,470
18....	103,910	91,980	121,220	187,420	194,320	201,080	217,760	224,860	228,930	210,200	179,170	137,080
19....	102,850	92,050	130,120	186,110	194,620	201,380	218,070	224,690	228,930	208,110	179,010	134,560
20....	101,610	92,180	132,940	184,760	194,920	201,590	218,560	224,690	228,930	206,110	178,760	132,040
21....	100,560	92,360	134,630	183,410	195,140	201,850	219,490	224,600	229,150	204,630	178,550	129,480
22....	99,260	92,630	136,910	182,060	195,400	202,460	220,770	224,290	229,510	203,110	178,340	126,910
23....	98,280	92,880	138,630	180,890	195,820	202,890	222,110	224,200	229,690	201,590	178,170	124,660
24....	97,160	93,080	139,890	179,970	196,250	203,330	223,350	224,200	229,560	199,950	177,880	123,700
25....	96,530	93,260	140,850	179,720	196,680	203,670	224,370	224,060	229,330	198,140	177,670	122,510
26....	96,210	93,400	142,190	180,550	197,070	204,110	225,220	224,020	229,150	196,420	177,340	121,330
27....	95,900	93,600	145,120	181,390	197,370	204,540	225,490	224,150	228,970	194,070	177,130	120,040
28....	95,380	93,810	150,580	181,940	197,590	204,930	225,580	224,600	228,790	192,010	176,800	117,820
29....	94,850	94,050	160,860	183,160	.....	205,540	225,840	225,130	228,660	189,930	175,880	114,770
30....	94,230	94,580	168,660	183,660	.....	205,980	226,200	226,160	228,610	187,930	175,340	112,700
31....	93,670	.....	173,060	183,910	.....	206,460	.....	227,500	.....	185,350	174,840	.....

KACHESS RIVER NEAR EASTON, WASH.

LOCATION.—In sec. 3, T. 20 N., R. 13 E., three-fourths mile below Kachess storage dam, a quarter of a mile above mouth, and 2 miles northwest of Easton, Kittitas County.

DRAINAGE AREA.—64 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 20, 1903, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder at highway bridge, installed August 15, 1916; inspected by I. Pennington and Fred Diener; original staff gage on left bank a quarter of a mile below Kachess storage dam was replaced by water-stage recorder at same site and datum July 22, 1913.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet below site of old gage or by wading.

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CHANNEL AND CONTROL.—Bed at old station composed of light gravel and sand; shifting frequently. Control formed by broad riffle 125 feet below gage; shifting. High water in Yakima River causes backwater at gage at infrequent intervals.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.38 feet at 8 p. m. September 6 (discharge, 1,290 second-feet). Practically no flow November 13 to January 2 and January 27 to April 10.

1904–1918: Maximum stage recorded, 8.0 feet at 8.30 a. m. November 16, 1906 (discharge, 1,760[1] second-feet). Practically no flow when gates in dam are closed.

ICE.—Stage-discharge relation not affected by ice during current year.

DIVERSIONS.—None.

REGULATION.—Flow controlled by storage and release of water in Kachess Lake reservoir. Monthly discharge, without storage, determined from records of stage of reservoir.

ACCURACY.—Stage-discharge relation affected by backwater from Yakima River January 2–27, April 16–25, May 27 to June 30, and July 31 to September 4 when water was being released from Keechelus reservoir and gates were closed at Kachess reservoir. Rating curve for normal conditions fairly well defined; backwater curve fairly well defined between 500 and 1,200 second-feet and poorly defined below. Water-stage recorder inspected once daily; operation satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records fair.

COOPERATION.—United States Reclamation Service furnished field data and rating tables.

Discharge measurements of Kachess River near Easton, Wash., during the year ending Sept. 30, 1918.

[Made by F. E. Moxley.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 8	4.31	286	June 11	[a] 5.83	922
Jan. 15	[a] 5.93	984	July 16	5.98	1,140
May 18	5.23	641	Aug. 7	[a] 5.17	577

[a] Affected by backwater from Yakima River.

[1] Revised from original data.

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Daily discharge, in second-feet, of Kachess River near Easton, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.
1	408	297	.....	.....	.....	760	435	184	204	455
2	428	222	.....	.....	.....	810	415	109	217	542
3	428	140	.....	377	.....	860	455	109	204	745
4	428	140	.....	377	.....	1,060	519	251	204	910
5	414	140	.....	396	.....	1,060	519	585	308	1,090
6	428	140	.....	377	.....	995	519	810	566	1,290
7	375	140	.....	566	.....	810	566	910	566	1,170
8	309	130	.....	855	.....	710	745	960	542	1,170
9	297	130	.....	855	.....	560	855	1,010	217	1,170
10	297	130	.....	855	.....	492	910	960	217	1,170
11	369	130	.....	800	19	408	910	660	217	1,170
12	537	100	.....	910	19	350	910	585	217	1,170
13	660	.....	.....	1,020	19	428	690	585	217	1,170
14	635	.....	5	965	19	537	519	585	217	1,170
15	635	.....	5	1,020	28	660	497	880	217	1,170
16	635	.....	.....	1,020	68	660	519	1,060	217	1,230
17	635	.....	.....	1,020	75	660	497	1,110	217	1,230
18	635	.....	.....	1,020	71	635	415	1,110	217	1,230
19	635	.....	.....	1,020	70	537	359	1,110	204	1,230
20	635	.....	.....	1,020	69	470	359	960	191	1,230
21	635	.....	.....	1,020	72	470	291	860	191	1,230
22	610	.....	.....	1,020	95	470	324	910	191	1,230
23	635	.....	.....	1,020	117	369	435	960	191	1,170
24	504	.....	.....	1,020	95	314	476	960	179	910
25	332	.....	.....	1,020	76	314	435	1,010	167	710
26	314	.....	.....	62	202	250	377	1,060	167	710
27	314	.....	.....	.....	470	167	260	1,110	167	710
28	314	.....	.....	.....	492	167	260	1,110	351	860
29	314	.....	.....	.....	537	179	260	1,170	398	1,060
30	314	.....	.....	.....	610	245	260	1,230	260	1,060
31	314	.....	.....	.....	.....	359	.....	935	324	.....

NOTE.—No flow on days for which no record is given.

Monthly discharge of Kachess River near Easton, Wash., for year ending Sept. 30, 1918.

[Drainage area, 64 square miles.]

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
October	660	297	465	28,600	−25,400	3,200	52.0	0.812	0.94
November	297	0	61.3	3,650	+ 910	4,560	76.6	1.20	1.34
December	5	0	.32	19.7	+78,500	78,500	1,280	20.0	23.06
January	1,020	0	633	38,900	+10,800	49,700	808	12.6	14.53
February	0	0	0	0	+13,700	13,700	247	3.86	4.02
March	0	0	0	0	+ 8,870	8,870	144	2.25	2.59
April	610	0	107	6,370	+19,700	26,100	439	6.86	7.65
May	1,060	167	541	33,300	+ 1,300	34,600	563	8.80	10.14
June	910	260	500	29,800	+ 1,110	30,900	519	8.11	9.05
July	1,230	109	834	51,300	−43,300	8,000	130	2.03	2.34
August	566	167	257	15,800	−10,500	5,300	86.2	1.35	1.56
September	1,290	455	1,050	62,500	−62,100	400	6.7	.105	.12
The year	1,290	0	372	270,000	−6,320	264,000	365	5.70	77.34

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CLE ELUM LAKE NEAR ROSLYN, WASH.

LOCATION.—In sec. 10, T. 20 N., R. 14 E., at outlet of lake, 4 miles northwest of Roslyn, Kittitas County, and 7½ miles northwest of Cle Elum.

DRAINAGE AREA.—202 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 4 to June 9, 1906; October 1, 1906, to September 30, 1918.

GAGE.—Water-stage recorder installed November 8, 1916; inspected by J. G. Giddings. Vertical staff on left abutment of temporary crib dam, installed June 17, 1907; zero at elevation of gate sills, 2,122.75 feet. Considerable fall between lake and dam for stages below 5.0 feet; auxiliary gages at same datum about 200 feet above dam, installed October, 1907, and July 16, 1915, used to obtain true elevation of lake at low stages.

EXTREMES OF STAGE.—Maximum stage during year from water-stage recorder, 19.10 feet at 6 a. m. December 30 (contents, 43,180 acre-feet); minimum stage recorded, 3.40 feet October 26 (contents, 7,090 acre-feet).

1907–1918: Maximum stage recorded same as above; minimum stage estimated at 1.15 feet August 31, 1906 (contents, 2,380 acre-feet).

STORAGE.—Capacity of reservoir at crest of spillway (gage height, 11.3 feet), 24,100 acre-feet. Storage or release each month used for determining discharge without storage for gaging station below dam.

COOPERATION.—Records furnished by United States Reclamation Service.

Daily contents, in acre-feet, of Cle Elum Lake near Roslyn, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1...	11,660	8,310	19,040	36,040	22,760	25,300	26,890	29,880	29,780	27,170	25,760	14,940
2...	11,740	8,560	19,260	33,760	21,620	25,260	26,840	30,000	29,020	27,360	25,830	13,920
3...	11,740	9,410	19,480	31,560	21,120	25,280	26,660	30,810	28,360	27,240	25,880	13,100
4...	11,780	9,510	20,020	30,880	20,510	25,300	26,540	31,340	28,150	27,080	25,740	12,400
5...	11,950	10,090	20,350	30,550	20,900	25,300	26,730	31,320	28,550	26,960	25,710	11,700
6...	12,270	10,510	20,790	29,920	21,980	25,260	26,780	30,620	29,400	26,870	25,530	11,230
7...	12,420	11,060	20,700	29,540	22,870	25,210	26,800	29,850	30,690	26,840	25,620	10,620
8...	12,490	11,530	19,700	28,810	23,650	25,210	26,820	29,280	31,320	26,820	25,510	10,210
9...	12,700	11,890	18,650	28,360	24,330	25,240	26,960	28,850	31,290	26,840	25,580	9,830
10...	12,760	12,210	17,850	27,870	25,330	25,240	27,380	28,430	31,780	26,980	25,710	9,560
11...	12,760	12,340	16,980	27,610	25,810	25,240	27,780	28,120	31,780	27,010	25,900	9,320
12...	12,810	12,590	16,190	27,500	26,060	25,240	28,080	28,310	31,370	26,820	25,900	9,010
13...	12,590	12,810	15,800	27,240	26,080	25,170	28,080	28,810	31,660	26,610	25,780	8,860
14...	11,700	12,910	18,780	27,010	26,060	25,120	27,890	29,500	31,760	26,450	25,690	8,670
15...	11,210	13,080	24,720	26,820	25,990	25,100	27,700	29,680	30,690	26,450	25,600	8,560
16...	10,260	13,190	27,870	26,680	25,880	25,140	27,380	29,500	29,680	26,570	25,600	8,400
17...	8,350	13,280	29,300	26,570	25,830	25,210	27,150	29,090	29,380	26,680	25,550	8,310
18...	9,410	13,440	34,180	26,340	25,760	25,210	26,870	28,880	29,330	26,840	25,490	8,310
19...	8,990	13,660	37,300	26,040	25,670	25,210	26,840	28,500	29,120	26,840	25,490	8,230
20...	8,560	13,830	33,000	25,600	25,580	25,240	27,120	28,240	28,900	26,710	25,420	8,020
21...	7,930	14,090	30,470	25,030	25,530	25,300	27,910	27,870	28,930	26,540	25,170	7,890
22...	7,720	14,680	29,350	24,330	25,530	25,440	29,090	27,560	29,120	26,310	24,690	7,780
23...	7,510	15,480	29,120	23,830	25,510	25,530	29,660	27,450	29,350	26,200	24,080	7,660
24...	7,370	16,060	28,620	24,170	25,490	25,690	29,920	27,400	29,300	26,170	23,140	7,550
25...	7,230	16,450	27,890	24,350	25,440	25,810	29,680	27,360	28,970	26,100	22,220	7,510
26...	7,090	16,880	27,640	24,350	25,440	25,990	29,260	27,290	28,620	26,040	21,320	7,490
27...	7,350	17,200	28,970	24,350	25,400	26,080	28,970	27,190	28,360	25,970	20,290	7,470
28...	7,610	17,630	33,000	24,100	25,370	26,130	28,930	27,400	28,080	25,920	18,720	7,340
29...	7,720	18,060	39,200	24,240	.....	26,150	29,210	28,080	27,730	25,880	17,180	7,260
30...	8,040	18,610	40,730	24,040	.....	26,380	29,610	29,210	27,590	25,810	15,440	7,190
31...	8,140	.....	35,590	23,560	.....	26,750	.....	30,190	.....	25,760	13,060	.....

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CLE ELUM RIVER NEAR ROSLYN, WASH.

LOCATION.—In sec. 10, T. 20 N., R. 14 E., below temporary crib dam at outlet of Cle Elum Lake, 4 miles northwest of Roslyn, Kittitas County, and 7½ miles northwest of Cle Elum.

DRAINAGE AREA.—202 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 10, 1903, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank 800 feet below temporary crib dam, installed October 14, 1913; inspected by J. G. Giddings. For description of previous gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable about 350 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and boulders; shifting at high water. No well-defined control. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 13.42 feet, 11 p. m. December 29 to 1 a. m. December 30 (discharge, 14,800 second-feet); minimum stage recorded, 0.29 foot at 2 p. m. October 31 (discharge, 12 second-feet).

1904–1918: Maximum stage recorded, 14.05 feet at 2 p. m. November 15, 1906 (discharge, 18,700 second-feet); minimum stage recorded, zero at 6 p. m. September 28, 1914 (discharge practically zero).

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—None.

REGULATION.—Flow partly controlled by storage and release of water at Cle Elum Lake reservoir. Monthly discharge without storage determined from records of stage at reservoir.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined up to 4,500 second-feet. Water-stage recorder inspected twice daily. Daily discharge ascertained by applying to rating table mean daily gage height determined from inspection of recorder graph or for days of considerable variation in stage by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent except for extremely high water.

COOPERATION.—United States Reclamation Service made current-meter measurements and computed discharge.

Discharge measurements of Cle Elum River near Roslyn, Wash., during the year ending Sept. 30, 1918.

[Made by F. E. Moxley.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 9	0.66	43	Apr. 2	3.30	928
Dec. 27	4.73	2,220	June 10	6.60	4,080
Jan. 11	4.01	1,470	July 15	2.91	771
Feb. 8	1.14	133	Aug. 5	2.22	439

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Daily discharge, in second-feet, of Cle Elum River near Roslyn, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	268	17	76	8,140	940	322	1,030	2,680	2,680	1,250	518	874
2	271	20	83	6,230	1,000	309	1,000	2,780	2,170	1,220	522	770
3	268	26	79	4,350	970	319	940	3,080	1,840	1,170	518	720
4	224	44	64	3,520	910	322	880	3,520	1,680	1,120	495	632
5	181	79	55	3,300	518	322	822	3,520	1,880	1,060	457	554
6	119	74	79	2,880	126	319	793	2,980	2,390	1,040	417	509
7	184	51	375	2,680	147	291	793	2,580	3,190	988	405	449
8	142	69	569	2,260	173	297	822	2,300	3,520	988	401	424
9	160	85	559	1,960	173	297	880	2,040	3,630	1,010	401	398
10	193	98	573	1,800	319	291	1,060	1,800	3,990	1,070	444	380
11	164	114	545	1,520	482	294	1,290	1,680	3,990	1,060	504	355
12	224	128	559	1,400	622	294	1,480	1,720	3,630	982	536	338
13	487	139	569	1,290	632	282	1,440	2,000	3,870	886	509	325
14	541	161	607	1,180	607	265	1,360	2,350	3,990	810	457	313
15	522	173	746	1,090	588	256	1,250	2,530	3,190	781	431	297
16	478	173	1,640	1,000	554	282	1,090	2,390	2,530	845	428	291
17	432	112	2,390	910	513	285	970	2,210	2,350	910	428	288
18	390	83	7,230	880	478	288	910	2,040	2,300	946	405	277
19	355	87	9,420	932	456	291	880	1,880	2,170	952	390	262
20	335	69	5,670	880	428	306	1,000	1,720	2,040	892	420	262
21	310	76	3,410	990	408	325	1,400	1,520	2,080	822	588	254
22	274	94	2,680	880	398	365	2,040	1,320	2,210	753	583	245
23	254	92	2,350	764	390	420	2,440	1,250	2,350	699	684	237
24	248	76	1,960	793	383	448	2,580	1,250	2,300	667	822	234
25	245	61	1,560	880	379	491	2,440	1,180	2,120	637	822	229
26	147	62	1,360	880	365	588	2,210	1,150	1,920	607	822	218
27	59	81	2,210	880	348	627	2,040	1,120	1,800	573	874	208
28	33	73	5,390	851	338	647	2,040	1,180	1,640	550	928	206
29	14	70	11,700	880	.....	667	2,170	1,560	1,400	531	934	206
30	13	67	11,900	851	.....	764	2,440	2,260	1,320	513	940	208
31	12	.....	7,680	822	.....	940	.....	2,780	.....	513	922	.....

Monthly discharge of Cle Elum River near Roslyn, Wash., for year ending Sept. 30, 1918.

[Drainage area, 202 square miles.]

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
October	541	12	242	14,900	− 3,710	11,200	182	0.901	1.04
November	173	17	85.1	5,060	+10,500	15,600	262	1.30	1.45
December	11,900	55	2,710	167,000	+17,000	184,000	2,990	14.8	17.06
January	8,140	764	1,860	114,000	−12,000	102,000	1,660	8.22	9.48
February	1,000	126	487	27,000	+ 1,810	28,800	519	2.57	2.68
March	940	256	394	24,200	+ 1,380	25,600	416	2.06	2.38
April	2,580	793	1,420	84,500	+ 2,860	87,400	1,470	7.28	8.12
May	3,520	1,120	2,080	128,000	+ 580	129,000	2,100	10.4	11.99
June	3,990	1,320	2,540	151,000	− 2,600	148,000	2,490	12.3	13.72
July	1,250	513	866	53,200	− 1,830	51,400	836	4.14	4.77
August	940	390	581	35,700	−12,700	23,000	374	1.85	2.13
September	874	206	365	21,700	− 5,870	15,800	266	1.32	1.47
The year	11,900	12	1,140	826,000	− 4,660	821,000	1,130	5.59	76.29

NACHES RIVER BELOW TIETON RIVER, NEAR NACHES, WASH.

LOCATION.—In sec. 35, T. 15 N., R. 16 E., 600 feet below Tieton River, 500 feet above intake of Wapatox power canal, and 5 miles northwest of Naches, Yakima County.

DRAINAGE AREA.—942 square miles (measured on topographic maps and drainage map published in Water-Supply Paper 369).

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RECORDS AVAILABLE.—August 4 to October 28, 1905; March 16, 1909, to October 31, 1912; May 10 to September 30, 1915; April 13, 1916, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank, referred to same datum as previous gage; installed December 7, 1916; inspected by N. E. Wray, David Rasmusson, A. C. Saunders, and Paul Mitchel. Previous gages as follows: August 4 to October 28, 1905, vertical staff nailed to stump on left bank at nearly same site as present gage but at different datum; March 16, 1909, to December 7, 1916, inclined and vertical staff gage on left bank in two sections 8 feet above cable; April 3, 1916, vertical staff installed to supplement inclined and vertical sections.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Bed of stream composed of small boulders and gravel; shifts at extremely high water. Control at riffle, 200 feet downstream, shifting during high water. One channel except at extremely high stages when a small overflow channel at right bank carries water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.7 feet at 4 a. m. December 30 (discharge, 16,800 second-feet); minimum stage recorded, 1.62 feet at 5 p. m. November 20, and 1.67 feet September 23 (discharge, 202 second-feet).

1905, 1909–1918: Maximum stage recorded, 8.9 feet at 8 a. m. November 24, 1909 (discharge, 18,800 second-feet); minimum stage same as above.

ICE.—Stage-discharge relation not affected by ice during current year.

DIVERSIONS.—Above all important diversions except Selah Valley and Tieton canals.

REGULATION.—Flow partly controlled by storage and release of water at Bumping Lake. See record for Bumping Lake and table of monthly discharge for Bumping River near Nile, Wash.

ACCURACY.—Stage-discharge relation changed December 29 and June 10; possibly affected during periods of low stage by backwater from wing dam extended across the river for the purpose of regulating head on Wapatox canal intake. No definite information on effect of backwater, but probably slight. Rating curves well defined below 8,000 second-feet; extended above. Water-stage recorder in operation October 1 to December 1, December 14 to February 12, April 2 to September 9, and September 20 to 30, and inspected three times daily during these periods. Staff gage read three times daily at other times. Gage-height record fairly reliable. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for periods of extreme low and high water, for which they are fair.

COOPERATION.—Maintained by United States Reclamation Service in cooperation with Pacific Power & Light Co. United States Reclamation Service made discharge measurements and computed discharge.

Discharge measurements of Naches River below Tieton River, near Naches, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 3	Philpott and Moxley	2.21	421	Apr. 8	F. E. Moxley	[a]3.78	1,610
Nov. 3	F. E. Moxley	2.00	340	June 7	do	5.83	4,330
Dec. 21	do	6.14	4,660	July 9	do	3.11	1,090
Feb. 12	do	3.85	1,750	31	do	2.46	539

[a] Stage-discharge relation affected by backwater from temporary dam below heading of Wapatox canal.

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Daily discharge, in second-feet, of Naches River below Tieton River, near Naches, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	404	304	377	14,100	1,750	1,240	2,010	2,850	3,040	1,340	663	339
2	404	335	339	10,800	1,850	1,200	1,750	3,040	2,660	1,250	675	335
3	413	348	316	8,260	1,900	1,200	1,650	3,390	2,350	1,160	590	316
4	404	460	323	7,550	1,900	1,200	1,700	3,820	2,350	1,040	465	308
5	377	413	304	6,870	2,010	1,160	1,650	3,970	2,590	1,000	446	308
6	369	377	308	5,850	1,900	1,080	1,650	3,670	3,320	970	516	312
7	339	352	271	6,020	1,850	1,080	1,650	3,390	4,120	903	511	327
8	323	331	289	5,370	1,800	1,200	1,700	3,180	4,890	903	521	316
9	323	308	296	4,730	1,700	1,200	1,900	2,980	4,730	935	542	323
10	323	296	289	4,120	1,800	1,200	2,290	2,660	5,370	1,040	537	331
11	304	300	308	3,820	1,850	1,200	2,470	2,410	4,960	935	548	316
12	285	312	451	3,820	1,750	1,200	2,530	2,350	4,640	838	496	327
13	274	304	574	3,530	1,700	1,010	2,410	2,470	5,130	763	456	319
14	282	271	1,780	3,390	1,600	1,010	2,230	2,920	4,960	686	574	364
15	285	247	1,780	3,040	1,500	1,010	2,010	3,320	3,700	716	635	348
16	271	240	1,530	2,780	1,550	1,040	1,900	3,250	2,960	870	640	316
17	253	240	2,060	2,590	1,500	1,040	1,750	2,980	2,960	870	629	300
18	244	234	9,890	2,720	1,460	1,120	1,700	2,850	2,820	838	629	282
19	234	208	12,000	2,530	1,410	1,120	1,700	2,660	2,560	782	629	271
20	250	205	6,490	2,290	1,280	1,120	1,850	2,470	2,490	745	607	247
21	247	250	4,800	2,290	1,360	1,120	2,350	2,180	2,620	710	408	237
22	274	296	5,640	2,120	1,550	1,280	3,180	2,010	2,890	716	386	230
23	244	278	5,640	2,180	1,750	1,360	3,390	1,900	2,820	698	451	202
24	244	260	4,320	2,180	1,320	1,410	3,460	1,850	2,560	635	470	215
25	267	237	3,400	2,290	1,240	1,900	3,320	1,800	2,240	542	432	208
26	296	244	3,100	2,120	1,280	1,550	2,850	1,700	1,950	602	418	247
27	304	304	5,640	2,060	1,240	1,410	2,660	1,650	1,890	511	460	271
28	300	296	10,100	2,010	1,200	1,320	2,530	1,550	1,680	456	456	360
29	278	304	15,600	1,960	.....	1,410	2,590	1,600	1,530	432	451	369
30	271	343	15,400	1,800	.....	1,700	2,850	2,120	1,380	506	465	356
31	267	.....	12,000	1,460	.....	2,060	.....	2,980	.....	521	386	.....

Monthly discharge of Naches River below Tieton River, near Naches, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	413	234	302	18,600
November	460	205	297	17,700
December	15,600	271	4,050	249,000
January	14,100	1,460	4,090	251,000
February	2,010	1,200	1,610	89,400
March	2,060	1,010	1,260	77,500
April	3,460	1,650	2,260	134,000
May	3,970	1,550	2,640	162,000
June	5,370	1,380	3,140	187,000
July	1,340	432	804	49,400
August	675	386	519	31,900
September	369	202	300	17,900
The year	15,600	202	1,780	1,290,000

BUMPING LAKE NEAR NILE, WASH.

LOCATION.—At storage dam at outlet of Bumping Lake, 12 miles above American River and 19 miles west of Nile, Yakima County.

DRAINAGE AREA.—68 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 27 to November 22, 1909; November 3, 1910, to September 30, 1918.

GAGE.—Vertical staff on face of gate tower; read by J. H. Nelson, Datum, mean sea level. Prior to November 3, 1910, vertical staff on north shore of lake, one-fourth mile above outlet, at different datum.

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EXTREMES OF STAGE.—Maximum stage recorded during year, 3,429.75 feet at 4 p. m. December 29 (contents, 38,740 acre-feet); minimum stage recorded, 3,392.30 feet October 20–23, and October 28 to November 2 (contents, 2,090 acre-feet).

1911–1918: Maximum stage recorded December 29, 1917; minimum stage recorded, 3,391 feet February 12–15, 1916 (contents, 1,260 acre-feet).

STORAGE.—Capacity of reservoir at crest of spillway, 33,700 acre-feet. Elevation of gate sill, 3,389 feet, and of spillway crest, 3,426 feet. Storage or release each month used for determining discharge without storage for gaging station below dam.

ACCURACY.—Gage read to hundredths twice daily. Storage computed by United States Reclamation Service.

COOPERATION.—Records furnished by United States Reclamation Service.

Daily contents, in acre-feet, of Bumping Lake near Nile, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,750	2,090	5,840	37,850	31,970	21,200	13,670	31,140	37,550	36,900	31,520	12,440
2	2,620	2,090	5,950	36,760	31,340	20,750	14,070	32,390	37,470	36,830	31,080	11,970
3	2,530	2,380	6,090	36,020	30,700	20,130	14,440	33,730	37,410	36,760	30,580	11,550
4	2,460	2,940	6,230	35,750	30,120	19,550	14,710	35,350	37,280	36,760	30,200	11,030
5	2,410	3,360	6,320	35,490	29,830	18,900	15,040	36,900	37,330	36,680	29,860	10,540
6	2,360	3,590	6,400	35,320	29,770	18,690	15,410	37,170	37,600	36,630	29,340	10,160
7	2,330	3,650	6,510	35,530	29,650	18,360	15,720	37,170	37,880	36,560	28,750	9,690
8	2,280	3,730	6,650	35,260	29,500	17,650	16,080	37,170	38,050	36,490	28,180	9,180
9	2,280	3,790	6,750	35,000	29,250	16,980	16,540	37,140	38,010	36,420	27,580	8,650
10	2,250	3,840	6,810	34,730	29,100	16,370	16,980	37,030	38,260	36,450	27,010	8,120
11	2,220	3,900	6,890	34,620	28,890	15,740	17,670	36,900	38,050	36,360	26,450	7,680
12	2,150	3,970	7,020	34,560	28,640	15,110	18,240	36,960	37,990	36,290	25,920	7,200
13	2,140	4,110	7,330	34,430	28,400	14,760	18,750	37,030	37,990	36,120	25,360	6,590
14	2,120	4,190	7,900	34,230	28,160	14,390	19,160	37,140	37,880	35,910	24,620	6,030
15	2,120	4,310	8,680	34,070	27,840	13,980	19,580	37,170	37,600	35,710	23,620	5,510
16	2,120	4,370	9,610	33,970	27,550	13,530	20,030	37,100	37,440	35,650	22,680	4,940
17	2,120	4,440	11,220	33,970	27,320	13,140	20,450	37,100	37,440	35,480	21,980	4,490
18	2,120	4,490	14,560	34,100	27,010	12,700	20,880	37,030	37,440	35,250	20,980	4,100
19	2,120	4,530	21,140	34,030	26,680	12,270	21,280	36,960	37,370	35,050	19,940	3,770
20	2,090	4,660	23,720	34,030	26,270	11,890	21,690	36,900	37,370	34,850	19,130	3,420
21	2,090	4,810	24,940	33,970	25,630	11,630	22,350	36,900	37,440	34,560	18,790	3,190
22	2,090	4,870	26,300	33,860	24,700	11,580	23,170	36,900	37,440	34,320	18,480	3,110
23	2,090	5,060	27,820	33,770	23,850	11,300	24,080	36,790	37,440	34,060	18,260	2,910
24	2,120	5,130	28,520	33,770	23,420	11,110	24,900	36,760	37,300	33,840	17,770	2,740
25	2,120	5,210	29,030	36,600	22,980	11,010	25,940	36,760	37,300	33,600	17,280	2,590
26	2,120	5,280	29,460	33,450	22,530	11,340	26,800	36,760	37,240	33,510	16,660	2,420
27	2,120	5,350	31,270	33,380	22,090	11,760	27,550	36,760	37,170	33,340	15,940	2,360
28	2,090	5,490	34,820	33,220	21,630	12,140	28,450	36,790	37,100	33,150	15,200	2,300
29	2,090	5,630	38,640	33,040	.....	12,460	29,300	37,240	37,030	32,930	14,360	2,250
30	2,090	5,740	38,120	32,830	.....	12,870	30,170	37,510	36,960	32,480	13,440	2,220
31	2,090	.....	37,100	32,570	.....	13,220	.....	37,640	.....	32,100	12,870	.....

BUMPING RIVER NEAR NILE, WASH.

LOCATION.—A quarter of a mile below spillway of Bumping Lake dam, half a mile below outlet conduit through storage dam, 11½ miles above American River, and 19 miles west of Nile, Yakima County.

DRAINAGE AREA.—68 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 13 to July 31, 1906; April 27, 1909, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank one-fourth mile below spillway of storage dam, installed June 17, 1913; inspected by J. H. Nelson. For description of previous gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable about 40 feet below gage or by wading.

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CHANNEL AND CONTROL.—Bed composed of large angular rocks and gravel; shifts at extremely high water. Riffle control 60 feet below gage; shifting during high water. Stage of zero flow, about gage height 0.6 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.33 feet at 5 p. m. December 29 (discharge, 5,180 second-feet); minimum stage recorded, 0.96 foot at 6 p. m. November 14 (discharge, 1.6 second-feet).

1906 and 1909–1918: Maximum stage same as above; practically no flow when gates in outlet conduit are closed.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—Flow partly controlled by storage and release of water at Bumping Lake reservoir. Monthly discharge without storage determined from records of stage at reservoir.

ACCURACY.—Stage-discharge relation changed at high water of December 29. Curves used before and after change well defined below 1,500 second-feet. Daily discharge ascertained by applying mean daily gage-height to rating table, or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records good below 100 second-feet and excellent above.

COOPERATION.—Gage-height record furnished by United States Reclamation Service.

No discharge measurements were made during the year.

Daily discharge, in second-feet, of Bumping River near Nile, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	121	47	2.2	1,840	518	356	11	24	628	394	389	295
2	107	27	1.9	1,920	512	352	11	25	530	365	335	291
3	96	3.2	1.9	1,560	512	352	11	28	560	348	291	295
4	89	2.2	1.9	1,400	506	352	12	33	622	322	276	287
5	86	2.0	1.8	1,240	395	348	11	322	698	303	331	284
6	80	2.0	1.8	1,200	335	348	12	692	970	287	380	306
7	78	2.0	1.8	1,200	331	380	12	679	1,200	276	389	327
8	76	2.0	1.8	1,080	327	461	13	628	1,280	273	380	314
9	73	1.9	1.7	873	327	461	16	566	1,240	269	380	314
10	72	1.8	1.7	724	327	455	17	495	1,360	269	375	310
11	70	1.8	1.9	634	322	434	17	429	1,320	269	375	327
12	68	1.7	2.4	597	322	380	17	429	1,280	266	365	322
13	67	1.7	7.0	524	322	291	17	501	1,400	263	478	335
14	66	1.6	12	495	318	284	17	622	1,240	260	584	331
15	60	1.6	6.4	434	314	276	16	634	970	260	572	310
16	55	1.6	10	394	314	276	16	584	825	260	566	280
17	52	1.7	18	375	314	273	16	560	818	256	572	253
18	52	1.7	49	403	310	269	14	512	764	253	572	223
19	52	1.8	44	384	306	269	15	466	738	256	560	196
20	51	1.8	140	365	412	269	16	413	731	256	378	166
21	51	1.7	322	348	518	269	18	370	798	253	284	144
22	49	1.7	335	339	578	269	21	356	832	256	314	127
23	49	1.8	335	331	461	269	21	352	825	256	375	107
24	49	1.8	339	331	356	273	24	343	731	237	365	94
25	49	1.8	348	331	356	139	24	335	666	204	361	81
26	49	1.8	356	327	356	9.4	24	327	591	204	380	73
27	48	1.8	356	327	356	8.2	24	310	548	204	370	66
28	47	2.0	1,280	327	356	8.2	24	213	495	204	408	62
29	45	2.0	4,520	327	.....	9.0	24	306	439	276	413	58
30	45	2.4	2,920	327	.....	10	24	603	413	314	356	55
31	45	.....	2,400	424	.....	11	.....	653	.....	343	287	.....

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Monthly discharge of Bumping River near Nile, Wash., for year ending Sept. 30, 1918.

[Drainage area, 68 square miles.]

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
October	121	45	64.4	3,960	− 790	3,170	51.6	0.759	0.88
November	47	1.6	4.23	252	+ 3,650	3,900	65.5	.963	1.07
December	4,520	1.7	446	27,400	+31,400	58,800	956	14.1	16.26
January	1,920	327	690	42,400	− 4,530	37,900	616	9.06	10.44
February	578	306	381	21,200	−10,900	10,300	185	2.72	2.83
March	461	8.2	263	16,200	− 8,410	7,790	127	1.87	2.16
April	24	11	17.2	1,020	+17,000	18,000	302	4.44	4.95
May	692	24	413	25,400	+ 7,470	32,900	535	7.87	9.07
June	1,400	413	850	50,600	− 680	49,900	839	12.3	13.72
July	394	204	273	16,800	− 4,860	11,900	194	2.85	3.29
August	584	276	402	24,700	−19,200	5,500	89.4	1.31	1.51
September	335	55	221	13,200	−10,600	2,600	43.7	.643	.72
The year	4,520	1.6	336	243,000	− 660	243,000	335	4.93	66.90

TIETON RIVER AT HEADWORKS OF TIETON CANAL, NEAR NACHES, WASH.

LOCATION.—In sec. 30, T. 14 N., R. 15 E. (unsurveyed), below intake of Tieton canal, 15 miles above mouth, and 16 miles southwest of Naches, Yakima County.

DRAINAGE AREA.—240 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 17 to September 17, 1906 (fragmentary gage-height record); July 5, 1907, to September 30, 1918.

GAGE.—Friez water-stage recorder on right bank about 1,000 feet below intake of Tieton canal; inspected by employees of United States Reclamation Service. For description of previous gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable about 500 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; shifts slightly at high water; gradient steep. No well-defined control. One channel at all stages

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 4.97 feet at 6.30 p. m. June 13 (discharge, 1,720 second-feet); minimum stage recorded 1.68 feet at 10 a. m. August 28 (discharge, 8 second-feet).

1907–1918: Maximum stage recorded 7.15 feet at 4 a. m. November 24, 1909 (discharge about 5,400 second-feet); minimum stage same as above.

ICE.—Record discontinued during winter.

DIVERSIONS.—Tieton canal has diverted water above the gage since 1910. Diversions through canal added to mean monthly flow to determine natural monthly discharge.

REGULATION.—Flow slightly regulated by storage and release of water at Clear Creek reservoir about 15 miles above gage. Purpose of regulation to obviate diurnal fluctuation during irrigation season.

ACCURACY.—Stage-discharge relation for low water changed slightly during winter; permanent during period of records. Rating curve well defined. Water-stage recorder inspected twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—United States Reclamation Service furnished field data.

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Discharge measurements of Tieton River at headworks of Tieton canal near Naches, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 6	Moxley and Philpott	2.79	222	Jan. 26	F. E. Moxley	3.63	578
Apr. 5	F. E. Moxley	3.44	496	July 29	do	2.45	104
25	do	3.75	701	Aug. 12	Blair and Moxley	2.18	46
Jan. 4	do	3.48	496				

Daily discharge, in second-feet, of Tieton River at headworks of Tieton canal, near Naches Wash., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	504	598	592	455	211	40	16	628	675	825	375	24	28
2	477	675	527	439	194	35	17	645	642	893	352	26	33
3	439	825	471	399	134	26	18	661	604	842	366	20	28
4	439	978	493	380	72	22	19	678	550	769	343	38	35
5	450	850	630	380	65	36	20	695	471	793	300	26	53
6	455	675	825	334	67	38	21	711	380	910	267	18	62
7	455	610	1,060	280	67	13	22	728	357	986	251	43	79
8	455	568	1,360	326	64	36	23	744	352	893	165	60	89
9	493	510	1,260	334	74	34	24	761	334	825	116	44	131
10	550	477	1,620	357	81	30	25	675	309	703	142	14	131
11	556	419	1,460	339	74	31	26	598	300	598	221	34	194
12	562	434	1,410	288	50	14	27	544	271	656	126	25	240
13	579	550	1,620	259	43	14	28	510	267	527	104	13	317
14	595	745	1,460	201	29	48	29	533	371	477	91	29	313
15	612	745	995	240	22	26	30	539	550	444	104	36	304
							31	.....	675	.....	136	37	.....

NOTE.—No gage-height record Apr. 13-23; discharge interpolated.

Monthly discharge of Tieton River at headworks of Tieton canal, Naches, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April	761	439	576	34,300
May	978	267	541	33,300
June	1,620	444	897	53,400
July	455	91	273	16,800
August	211	13	55.9	3,440
September	317	13	82.7	4,920

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Combined monthly discharge of Tieton River and canal at headworks of Tieton canal, near Naches, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 240 square miles.]

Month.	Discharge in second-feet.						Combined run-off.	
	River (mean).	Canal (mean).	Combined.				Inches.	Acre-feet.
			Maximum.	Minimum.	Mean.	Per square mile.		
April	576	553	844	439	631	2.63	2.93	37,500
May	541	298	1,280	572	839	3.50	4.04	51,600
June	897	304	1,920	752	1,200	5.00	5.58	71,400
July	273	306	762	398	579	2.41	2.78	35,600
August	55.9	298	518	284	354	1.48	1.71	21,800
September	82.7	235	370	272	318	1.32	1.47	18,900

TIETON CANAL NEAR NACHES, WASH.

LOCATION.—In sec. 30, T. 14 N., R. 15 E. (unsurveyed), below canal intake and 16 miles southwest of Naches, Yakima County.

RECORDS AVAILABLE.—Irrigation seasons 1910 to September 30, 1918.

GAGE.—Float gage installed in stilling well about 500 feet below canal intake; read by H. E. Andrus.

DISCHARGE MEASUREMENTS.—Made from gaging bridge 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Earth section merging into concrete-lined section 1,000 feet below gage.

EXTREMES OF DISCHARGE.—Irrigation seasons 1910–1918: Maximum stage recorded 4.78 feet June 9, 1918 (discharge, 310 second-feet); no flow reported during non-irrigating season.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—United States Reclamation Service made current-meter measurements and computed daily discharge.

Canal diverts water from right bank of Tieton River in sec. 30, T. 14 N., R. 15 E. Water is used for irrigation.

Discharge measurements of Tieton canal near Naches, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 25	F. E. Moxley	2.98	157	July 22	F. E. Moxley	4.74	296
May 9	do	4.66	298	Aug. 12	Blair and Moxley	4.68	296
June 4	do	4.70	304	29	F. E. Moxley	4.59	298
26	do	4.75	309	29	do	4.60	289
July 22	do	4.74	310				

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Daily discharge, in second-feet, of Tieton canal near Naches, Wash., for the year ending Sept. 30, 1918.

Day.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	89	258	301	307	307	294
2	.....	.....	89	283	301	308	306	294
3	.....	.....	89	285	302	307	307	296
4	.....	.....	.....	301	303	307	307	293
5	.....	.....	.....	301	302	308	307	293
6	.....	.....	.....	301	303	309	307	295
7	.....	.....	.....	300	303	307	304	289
8	.....	.....	.....	301	303	307	304	292
9	.....	.....	.....	301	303	310	299	294
10	.....	.....	.....	300	301	307	302	292
11	.....	.....	.....	299	301	307	298	288
12	36	.....	.....	301	303	307	300	294
13	50	.....	.....	302	301	307	241	291
14	65	.....	.....	301	299	289	290	293
15	80	.....	.....	300	301	308	301	287
16	100	.....	.....	300	302	307	299	289
17	100	.....	.....	301	301	308	298	265
18	100	.....	.....	300	301	308	299	244
19	100	.....	.....	300	301	307	299	237
20	100	.....	.....	300	303	307	294	236
21	100	.....	.....	301	303	305	299	230
22	100	.....	55	301	308	307	298	234
23	100	.....	71	301	307	305	298	227
24	100	.....	83	300	308	305	296	219
25	100	89	117	301	307	307	296	216
26	0	89	158	301	308	305	298	176
27	0	89	176	303	308	305	294	98
28	31	89	232	305	307	304	295	.....
29	31	89	241	301	308	307	294	.....
30	31	89	258	302	308	305	294	.....
31	.....	89	.....	302	.....	307	295	.....

Monthly discharge of Tieton canal near Naches, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November	100	0	44.1	2,620
March	89	0	20.1	1,240
April	258	0	55.3	3,290
May	305	258	298	18,300
June	308	299	304	18,100
July	310	289	306	18,800
August	307	241	298	18,300
September	296	0	235	14,000

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NORTH FORK OF AHTANUM CREEK NEAR TAMPICO, WASH.

LOCATION.—In NW., ¼ sec. 2, T. 12 N., R. 15 E., at Prior ranch, 100 feet below Nasty Creek and 3½ miles northwest of Tampico, Yakima County.

DRAINAGE AREA.—69 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 26, 1907, to September 30, 1918.

GAGE.—Stevens eight-day water-stage recorder on left bank, about 300 feet southeast of ranch house, installed April 14, 1918; inspected by F. B. Hill. Previous gages as follows: August 26, 1907, to April 1, 1913, and August 20, 1915, to September 5, 1916, vertical staff at same site and datum as present gage; April 2, 1913, to August 19, 1915, and September 6, 1916, to September 30, 1917, Stevens continuous water-stage recorder at same site and datum.

DISCHARGE MEASUREMENTS.—Made from gaging bridge 40 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Concrete control 50 feet below gage installed in November, 1915, slightly shifting. Stage of zero flow at time of construction of control, gage height 1.45 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.13 feet at 9 p. m. June 10 (discharge, 275 second-feet); minimum stage recorded, 1.76 feet during October (discharge, 17 second-feet); actual minimum probably occurred in the winter period of no record.

1907–1918: Maximum stage recorded, 4.60 feet at 9 a. m. June 18, 1916 (discharge, 728 second-feet); minimum stage recorded 1.60 feet at noon November 12, 1916 (discharge, 7 second-feet).

ICE.—Stage-discharge relation seriously affected by ice. Record discontinued during winter.

DIVERSIONS.—Station is above all diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during winter by wearing down of concrete control. Rating curves well defined. Staff gage read to hundredths four times during October. Record April to September from water-stage recorder not entirely satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined from inspection of recorder graph. Discharge interpolated for days when recorder did not operate. Records good except during June, for which they are fair.

Discharge measurements of North Fork of Ahtanum Creek near Tampico, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 16	T. R. Newell	2.00	36.5	Aug. 10	T. G. Bedford	1.87	27.0
Apr. 14	do	2.46	101	Sept. 6	R. Skillin	1.76	20.3

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Daily discharge, in second-feet, of North Fork of Ahtanum Creek near Tampico, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	.....	179	171	56	28	21
2	.....	.....	192	151	55	28	21
3	.....	.....	216	148	51	27	20
4	.....	.....	238	163	48	27	19
5	.....	.....	208	187	47	27	19
6	.....	.....	184	208	45	19	19
7	.....	.....	176	226	43	26	19
8	.....	.....	163	243	41	26	19
9	.....	.....	156	243	39	28	19
10	17	.....	144	263	39	26	18
11	.....	.....	144	243	38	26	18
12	.....	.....	153	223	37	25	18
13	.....	.....	166	203	36	24	19
14	.....	104	198	183	36	24	22
15	.....	94	198	163	35	25	20
16	.....	89	184	153	44	24	20
17	.....	84	179	146	34	25	19
18	17	84	166	141	31	25	19
19	.....	90	141	132	32	24	19
20	.....	106	139	124	33	24	19
21	.....	136	127	116	34	24	18
22	.....	166	127	108	36	24	18
23	.....	174	122	102	39	22	18
24	.....	176	117	92	35	22	18
25	.....	163	112	84	32	22	19
26	.....	146	110	78	31	21	18
27	17	141	108	72	31	21	18
28	.....	148	112	69	31	21	18
29	.....	158	141	63	29	21	18
30	.....	171	192	62	28	20	18
31	.....	.....	182	.....	27	20	.....

NOTE.—No gage-height record November to April 13. Recorder not operating, discharge interpolated, May 23, 24, 31, June 7, 11-14, 19-21, July 19, 20.

Monthly discharge of North Fork of Ahtanum Creek near Tampico, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 69 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
April 14-30	176	84	131	1.90	1.20	4,420
May	238	108	160	2.32	2.68	9,840
June	263	62	152	2.20	2.46	9,040
July	56	27	37.8	.548	.63	2,320
August	28	19	24.1	.349	.40	1,480
September	22	18	18.9	.274	.31	1,120
The period	.....	.....	.....	.....	7.68	28,200

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SOUTH FORK OF AHTANUM CREEK AT CONRAD RANCH, NEAR TAMPICO, WASH.

LOCATION.—In W. ½ sec. 23, T. 12 N., R. 15 E., at Conrad ranch, 2½ miles above mouth of North Fork, and 2¾ miles southwest of Tampico, Yakima County.

DRAINAGE AREA.—26 square miles (measured on topographic maps and Plate I, Water-Supply Paper 369).

RECORDS AVAILABLE.—March 15, 1915, to September 30, 1918.

GAGE.—Vertical staff on left bank about 75 feet from ranch house; read by Mrs. W. B. Conrad. Gage datum raised 1.00 foot on August 9, 1918.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and sand; somewhat shifting. Concrete control 7 feet downstream from gage; slightly shifting. Stage of zero flow, according to levels run August 9, 1918, gage height +0.05 feet (new datum).

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.95 feet May 15 (discharge, 50 second-feet); minimum stage probably occurred during the winter when record was discontinued.

1915–1918: Maximum stage recorded, 3.10 feet June 19, 1916 (discharge, 216 second-feet); minimum stage recorded, 0.60 foot September 25-26, 1915 (discharge, 4.3 second-feet).

ICE.—Stage-discharge relation seriously affected by ice; record discontinued during winter.

DIVERSIONS.—Small ditch diverting above gage supplies water to Conrad's hop fields.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly on October 25 by trees blown into creek by high wind; changed again during winter by wearing down of concrete control. Rating curves used for October well defined. Curve used April 13 to September 30, fairly well defined; gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of South Fork of Ahtanum River at Conrad ranch, near Tampico, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 16	T. R. Newell	1.68	11.4	Aug. 9	T. G. Bedford	[a] 1.54	9.9
Apr. 15	do	1.72	27.1	Sept. 6	R. Skillin	.50	7.5
May 4	do	1.94	49.0				

[a] Gage height, 0.54 foot, referred to new datum.

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Daily discharge, in second-feet, of South Fork of Ahtanum Creek at Conrad ranch, near Tampico, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.0	.....	41	43	14.3	9.0	7.1
2	7.6	.....	43	41	14.3	11.4	6.8
3	7.2	.....	46	39	14.3	9.0	6.8
4	7.2	.....	50	37	14.3	9.0	7.1
5	7.2	.....	46	39	12.7	8.5	6.8
6	7.2	.....	43	43	12.7	8.0	6.8
7	7.2	.....	41	45	12.0	8.5	7.5
8	7.2	.....	44	47	12.7	8.0	6.8
9	7.2	.....	41	47	12.0	9.6	7.1
10	7.2	.....	37	47	11.4	10.2	7.1
11	7.2	.....	37	45	11.4	9.6	7.5
12	7.2	.....	39	41	11.4	9.6	7.5
13	7.2	35	39	39	10.8	9.6	7.5
14	7.2	29	46	37	10.8	9.0	7.5
15	7.2	26	50	33	10.2	10.2	6.8
16	7.2	25	47	31	12.7	8.5	6.8
17	7.2	23	45	30	10.8	9.6	6.2
18	7.6	20	43	29	9.6	9.6	6.2
19	7.6	20	41	27	9.6	9.0	6.2
20	7.6	23	40	26	9.0	9.0	6.2
21	7.6	29	39	23	9.0	8.5	6.2
22	7.2	30	37	23	10.2	8.5	6.2
23	7.2	33	37	22	20	7.5	5.6
24	7.2	36	37	20	12.0	7.5	5.9
25	7.0	35	37	20	11.4	7.1	5.9
26	6.8	33	37	20	10.8	6.8	5.6
27	6.8	33	35	18.0	10.2	7.5	5.6
28	6.8	31	37	17.0	10.2	7.1	5.6
29	7.2	32	36	16.1	10.2	6.8	5.6
30	7.6	35	41	16.1	10.2	7.1	5.6
31	8.0	.....	45	.....	9.0	6.8	.....

Monthly discharge of South Fork of Ahtanum Creek at Conrad ranch, near Tampico, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8.0	6.8	72.8	448
April 13-30	36	20	29.3	1,050
May	50	35	41.2	2,530
June	47	16.1	32.0	1,900
July	20	9.0	11.6	713
August	11.4	6.8	8.58	528
September	7.5	5.6	6.54	389

NEW RESERVATION CANAL AT PARKER, WASH.

LOCATION.—In sec. 20, T. 12 N., R. 19 E., about a mile below intake of canal, three-fourths mile northwest of Parker, Yakima County, and 5½ miles northwest of Wapato.

RECORDS AVAILABLE.—Irrigation seasons 1904 to September 30, 1918.

GAGE.—Vertical staff at highway bridge a quarter of a mile below intake, installed before opening of irrigation season in 1917; read by G. M. Baugher. Gages previously used as follows: Prior to April 1, 1911, gage about a mile below intake; April 1, 1911, to April 26, 1916, about three-fourths mile below intake; April 26 to October 14, 1916, at highway bridge about a mile below intake.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed composed of gravel and small stones; permanent during irrigation season. Channel at times obstructed by aquatic plants.

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Extremes of discharge.—Maximum stage recorded during year, 5.88 feet July 2 to 6 (discharge, 1,010 second-feet). No flow reported during nonirrigation season. 1904-1918: Maximum stage recorded July 2 to 6, 1918. No flow reported during nonirrigation seasons.

Accuracy.—Stage-discharge relation permanent during each season. Rating curves well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage heights to rating table. Records excellent.

Cooperation.—Gage-height record and discharge measurements furnished by United States Reclamation Service and United States Office of Indian Affairs.

Canal diverts water from right bank of Yakima River in sec. 20, T. 12 N., R. 19 E., about 2 miles above intake of Old Reservation canal. Water is used for irrigation.

Discharge measurements of New Reservation canal at Parker, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	R. Skillin	2.77	193	May 20	R. Skillin	5.31	853
8	do	3.11	225	27	do	5.49	872
9	Austin Philpott	3.05	217	31	do	5.70	946
Apr. 8	R. Skillin	.42	39.5	June 12	do	5.52	926
13	do	1.20	130	24	do	5.73	956
15	do	1.31	140	July 11	Moxley and Skillin	5.71	982
19	do	2.04	212	22	R. Skillin	4.51	614
20	do	2.60	248	25	Moxley and Skillin	4.75	693
22	do	3.20	374	Aug. 5	R. Skillin	4.38	612
23	do	3.84	524	12	do	4.57	665
25	do	4.32	634	19	do	4.87	741
27	do	4.37	653	Sept. 4	do	4.50	639
May 6	do	5.22	840	17	do	4.05	556
10	do	5.30	863	23	do	3.38	400
13	Moxley and Skillin	5.37	854				

Daily discharge, in second-feet, of New Reservation canal at Parker, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	188	.....	755	934	987	633	730
2	193	.....	805	934	1,010	633	705
3	192	.....	856	960	1,010	633	681
4	205	.....	856	960	1,010	609	657
5	205	.....	681	987	1,010	633	657
6	202	.....	830	960	1,010	633	657
7	212	.....	856	987	987	609	705
8	223	.....	856	960	987	609	705
9	220	.....	856	960	987	633	705
10	226	19	856	960	960	657	681
11	220	28	856	934	934	681	681
12	217	28	882	908	830	681	681
13	220	72	882	984	856	681	681
14	220	99	121	960	830	705	657
15	.....	57	110	960	830	755	609
16	.....	77	657	934	830	755	585
17	.....	99	882	934	805	755	562
18	.....	237	805	960	705	755	539
19	.....	289	830	960	633	755	495
20	.....	347	856	987	633	755	474
21	.....	379	856	474	657	681	474
22	.....	495	882	960	657	657	474
23	.....	539	908	934	681	755	433
24	.....	609	908	908	681	755	414
25	.....	609	908	934	681	755	396
26	.....	633	908	960	681	755	363
27	.....	657	856	987	681	730	347
28	.....	657	830	960	681	730	289
29	.....	681	908	987	633	705	2
30	.....	730	908	987	657	681	2
31	.....	.....	934	.....	657	730	.....

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Monthly discharge of New Reservation canal at Parker, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-14	226	188	210	5,830
April 10-30	730	19	350	14,600
May	934	110	803	49,400
June	987	474	939	55,900
July	1,010	633	813	50,000
August	755	609	693	42,600
September	730	2	535	31,800

OLD RESERVATION CANAL AT PARKER, WASH.

LOCATION.—In sec. 28, T. 12 N., R. 19 E., 300 feet below intake, 500 feet above controlling waste of first lateral, 1 mile east of Parker, Yakima County, and 3½ miles northwest of Wapato.

RECORDS AVAILABLE.—Irrigation seasons 1904 to September 30, 1918.

GAGE.—Vertical staff on left side about 10 feet upstream from private farm bridge; read by H. B. Ealy. Prior to June 23, 1908, vertical staff on downstream end of right retaining wall of Northern Pacific Railway bridge, about half a mile below site of present gage and at different datum.

DISCHARGE MEASUREMENTS.—Made from gaging bridge at gage.

CHANNEL AND CONTROL.—Bed of old slough. Velocities high. No obstruction from growth of aquatic plants. Fairly permanent for each irrigation season.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.05 feet June 8 (discharge, 350 second-feet). No flow reported during nonirrigation season.

1904-1918: Maximum stage recorded on June 8, 1918. No flow reported during nonirrigating seasons.

ACCURACY.—Stage-discharge relation permanent during each season. Rating curves well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—Field data furnished by United States Reclamation Service and United States Office of Indian Affairs.

Canal diverts water from right bank of Yakima River in sec. 28, T. 12 N., R. 19 E., about half a mile above intake of Sunnyside canal. Water is used for irrigation.

Discharge measurements of Old Reservation canal at Parker, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	R. Skillin	2.30	79	June 19	R. Skillin	5.40	285
6	Moxley and Philpott	2.20	84	28	Skillin and Moxley	4.71	239
8	R. Skillin	2.32	80	July 10	do	4.41	202
Apr. 9	Skillin and Moxley	1.82	32.7	22	R. Skillin	4.11	161
18	R. Skillin	3.88	166	25	Skillin and Moxley	4.05	168
May 13	Skillin and Moxley	5.35	303	Aug. 5	R. Skillin	4.20	174
14	R. Skillin	5.85	326	12	do	4.22	179
14	do	5.85	340	29	do	3.48	130
20	do	5.18	268	Sept. 10	do	3.62	131
27	do	1.10	3.3	23	do	2.97	94
June 12	do	5.98	347				

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Daily discharge, in second-feet, of Old Reservation canal at Parker, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	82	.....	290	340	182	166	123
2	82	.....	290	340	206	182	123
3	83	.....	300	310	174	190	123
4	82	.....	310	290	174	182	123
5	81	.....	330	290	151	182	130
6	78	.....	330	310	151	174	137
7	74	.....	310	340	158	166	137
8	78	.....	290	350	166	158	137
9	78	.....	300	350	166	166	137
10	76	37	280	340	206	166	137
11	80	57	270	350	206	174	137
12	80	78	260	350	190	182	130
13	80	90	260	350	166	182	123
14	78	102	330	340	215	182	130
15	.....	123	340	330	151	182	137
16	.....	151	350	310	151	182	137
17	.....	151	310	300	182	190	123
18	.....	174	300	300	190	190	109
19	.....	251	270	290	190	190	116
20	.....	206	270	270	190	182	123
21	.....	224	270	270	182	166	109
22	.....	242	260	270	174	174	96
23	.....	251	251	270	166	166	96
24	.....	251	242	280	182	151	130
25	.....	280	233	98	166	151	62
26	.....	270	233	151	166	151	67
27	.....	270	233	242	166	144	67
28	.....	270	3	224	158	137	62
29	.....	270	3	206	151	123	62
30	.....	280	215	198	158	137	62
31	.....	.....	330	.....	151	130	.....

Monthly discharge of Old Reservation canal at Parker, Wash., for the the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-14	83	74	79.4	2,200
April 10-30	280	37	192	8,000
May	350	3	267	16,400
June	350	96	289	17,200
July	215	151	174	10,700
August	190	123	168	10,300
September	137	62	113	6,720

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SUNNYSIDE CANAL NEAR PARKER, WASH.

LOCATION.—In sec. 28, T. 12 N., R. 19 E., 600 feet below intake, 1½ miles east of Parker, and 3½ miles northwest of Wapato, Yakima County.

RECORDS AVAILABLE.—Irrigation seasons 1904 to Septmeber 30, 1918.

GAGE.—Lietz water-stage recorder on right side; installed April 20, 1909, and referred to vertical staff gage installed April 6, 1908; inspected daily by employee of United States Reclamation Service. Prior to April 6, 1908, vertical staff on left side about 200 feet above site of present gage and at different datum. An inclined staff, installed April 6, 1907, at about same site as present gage, was in use during 1907, but gage heights were referred to datum of original gage.

DISCHARGE MEASUREMENTS.—Made from gaging bridge 30 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel; fairly permanent. Operation of flashboard at drop No. 1 makes control changeable.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during the year, 1,240 second-feet on July 7; no flow reported during nonirrigating season.

1904–1918: Maximum mean daily discharge, 1,270 second-feet on July 21, 1917. No flow reported during nonirrigating seasons.

ACCURACY.—Stage-discharge relation changed during June and July. Rating curves well defined. Water-stage recorder inspected daily; operation satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table, shifting-control method used for periods of change. Discharge measurements made frequently. Records excellent.

COOPERATION.—United States Reclamation Service made current-meter measurements and computed discharge.

Canal diverts water from left bank of Yakima River in sec. 28, T. 12 N., R. 19 E., about half a mile below intake of Old Reservation canal. Water is used for irrigation.

Discharge measurements of Sunnyside canal near Parker, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec. ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	G. D. Hall	3.54	570	June 8	O. W. Lindgren	5.18	1,130
20	do	3.40	528	8	Lindgren and Hall	5.16	1,120
29	Hall and Edwards	2.90	382	18	O. W. Lindgren	5.21	1,130
Mar. 27	O. W. Lindgren	2.30	285	27	do	5.43	1,190
27	G. D. Hall	2.30	286	July 10	do	5.43	1,180
Apr. 14	Lindgren and Hall	2.71	358	19	do	5.56	1,200
11	do	3.70	632	30	do	5.34	1,130
20	O. W. Lindgren	4.72	962	Aug. 8	do	5.54	1,200
29	do	5.15	1,110	19	do	5.50	1,190
May 10	Lindgren and James	5.25	1,150	29	do	5.24	1,090
20	O. W. Lindgren	5.13	1,110	Sept. 9	do	4.95	985
23	G. D. Hall	5.18	1,110	19	Lindgren and James	4.70	906
23	O. W. Lindgren	5.18	1,090	30	B. G. James	4.28	762
26	do	5.20	1,130				
26	C. E. Edwards	5.20	1,140				

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Daily discharge, in second-feet, of Sunnyside canal near Parker, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	690	.....	.....	358	1,160	1,120	1,200	1,180	1,090
2	693	.....	.....	363	1,180	1,120	1,200	1,190	1,040
3	693	.....	.....	356	1,180	1,120	1,130	1,190	1,020
4	693	.....	.....	358	1,200	1,120	1,190	1,200	1,000
5	693	.....	.....	404	1,200	1,120	1,170	1,200	1,090
6	681	.....	.....	429	1,190	1,130	1,220	1,200	1,090
7	681	.....	.....	437	1,190	1,120	1,240	1,190	1,060
8	669	200	.....	455	1,190	1,120	1,220	1,200	1,040
9	660	.....	.....	503	1,180	1,140	1,210	1,200	1,000
10	655	.....	.....	562	1,170	1,140	1,180	1,200	989
11	602	.....	.....	627	1,180	1,140	1,200	1,200	989
12	594	.....	.....	657	1,160	1,140	1,190	1,200	996
13	591	.....	.....	663	1,180	1,140	1,210	1,200	989
14	614	.....	.....	710	1,160	1,130	1,200	1,200	1,000
15	620	.....	.....	742	1,170	1,130	1,200	1,200	985
16	617	.....	.....	768	1,160	1,140	1,220	1,200	989
17	591	.....	.....	826	1,140	1,130	1,210	1,190	962
18	563	.....	.....	850	1,120	1,130	1,210	1,190	959
19	557	.....	.....	891	1,120	1,130	1,210	1,190	909
20	540	.....	.....	909	1,120	1,130	1,190	1,140	909
21	516	.....	188	966	1,110	1,140	1,200	1,120	909
22	484	.....	188	989	1,120	1,160	1,200	1,100	895
23	466	.....	206	1,030	1,140	1,180	1,190	1,090	877
24	454	.....	225	1,050	1,140	1,180	1,210	1,100	860
25	439	.....	225	1,060	1,140	1,180	1,190	1,100	843
26	424	.....	266	1,090	1,140	1,170	1,180	1,100	822
27	415	.....	291	1,100	1,160	1,180	1,170	1,090	755
28	400	.....	313	1,090	1,120	1,180	1,170	1,090	752
29	386	.....	335	1,100	1,130	1,190	1,150	1,100	802
30	379	.....	313	1,120	1,140	1,200	1,160	1,090	782
31	375	.....	335	.....	1,140	.....	1,180	1,090	.....

Monthly discharge of Sunnyside canal near Parker, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	693	375	562	34,600
March 21–31	335	188	262	5,200
April	1,120	356	749	44,600
May	1,200	1,110	1,160	71,300
June	1,200	1,120	1,140	67,800
July	1,240	1,130	1,190	73,200
August	1,200	1,090	1,160	71,300
September	1,090	752	946	56,300

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RESERVATION DRAIN AT ALFALFA, WASH.

Location.—In sec. 29, T. 10 N., R. 21 E., at highway bridge a quarter of a mile southeast of Alfalfa, Yakima County, about 2 miles above mouth of drain.

Records available.—December 5, 1912, to September 30, 1918; miscellaneous measurements 1911 and 1912.

Gage.—Vertical staff on right bank under highway bridge; read by Miss Nellie Ide.

Discharge measurements.—Made from footbridge 1,000 feet below gage.

Channel and control.—Bed composed of gravel; shifting. No well-defined control.

Extremes of discharge.—Maximum stage during year, 8.2 feet on January 2, from high-water mark (discharge, estimated 1,500 second-feet); minimum stage recorded, 2.92 feet October 16 and 17 (discharge, 214 second-feet).

1913–1918: Maximum stage same as above; minimum stage recorded, 1.8 feet. July 3, August 12, 15–31, September 1–14, 19, 1915 (discharge, 145 second-feet).

Ice.—Ice does not form at this station.

Diversions.—None.

Regulation.—None.

Accuracy.—Stage-discharge relation changed several times during the year. Five rating curves, all parallel to a standard curve developed in previous years, and shifting-control method were used. Curves well defined below 500 second-feet. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent except for the high water early in January; daily discharge December 31 to January 2 is rough estimate only.

Cooperation.—Most of discharge measurements made by United States Office of Indian Affairs.

Reservation drain carries the return water from irrigation by the reservation canals and the underflow of Toppenish Valley. During the low-water period practically the whole flow of Toppenish Creek is carried into this channel by seepage.

Discharge measurements of Reservation drain at Alfalfa, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	R. Skillin	3.10	253	May 1	R. Skillin	3.15	221
13	do	3.03	237	18	do	3.51	286
20	do	3.06	243	25	do	3.48	278
27	do	3.10	251	June 1	do	3.40	266
Nov. 6	do	3.16	263	8	do	3.55	294
10	do	3.13	257	13	do	3.61	318
18	do	3.21	275	15	do	3.76	346
24	do	3.23	279	22	do	3.57	308
Dec. 7	do	3.24	280	29	do	3.50	291
14	do	3.25	279	July 20	do	3.35	258
15	T. R. Newell	3.26	288	27	do	3.42	274
22	R. Skillin	3.75	388	Aug. 3	do	3.50	292
Feb. 21	Skillin and Cunningham	3.35	284	10	do	3.40	272
Mar. 8	do	3.21	237	13	T. G. Bedford	3.56	302
19	T. R. Newell	3.16	225	17	R. Skillin	3.56	305
21	R. Skillin	3.18	236	24	do	3.81	366
Apr. 1	Skillin and Cunningham	3.29	247	30	do	3.62	321
18	T. R. Newell	3.21	240	Sept. 7	do	3.49	289
				21	do	3.67	330

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Daily discharge, in second-feet, of Reservation drain at Alfalfa, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	255	255	299	1,200	277	255	255	224	266	299	277	322
2	255	255	299	1,500	277	255	255	224	277	277	266	322
3	255	255	299	742	277	244	255	224	277	266	299	299
4	266	255	299	598	277	244	255	224	299	266	277	299
5	255	266	277	551	277	244	266	234	299	266	299	299
6	255	266	277	504	277	244	266	244	277	266	277	299
7	255	266	277	480	277	234	255	244	277	266	277	299
8	255	266	277	457	299	234	255	244	299	266	277	299
9	244	266	277	434	299	234	255	277	299	277	266	299
10	234	255	277	434	299	234	244	277	322	299	266	299
11	234	255	277	389	299	234	255	266	322	322	266	299
12	244	255	277	389	299	234	255	277	322	322	277	322
13	234	266	277	367	299	234	255	266	322	322	299	299
14	234	266	277	367	299	234	277	255	322	322	299	322
15	234	255	277	344	299	234	277	255	344	299	299	322
16	214	266	299	344	322	234	255	266	344	277	277	322
17	214	266	299	367	322	234	255	277	344	277	299	322
18	234	277	299	344	299	234	234	277	344	266	322	322
19	244	277	299	344	299	224	234	277	344	277	322	322
20	244	277	457	344	299	234	234	299	322	255	344	322
21	244	277	412	322	277	234	234	299	299	255	367	322
22	255	277	389	322	266	234	214	299	299	255	367	322
23	255	277	367	322	266	234	224	277	322	255	367	322
24	255	277	367	322	266	234	234	277	322	266	367	344
25	255	277	344	322	277	244	244	277	322	266	367	367
26	255	277	344	322	266	244	255	277	322	277	367	344
27	255	277	322	322	266	255	234	277	322	277	367	344
28	244	277	344	299	266	255	234	255	299	277	344	344
29	244	277	367	299	.....	255	224	255	299	277	344	322
30	255	277	504	299	.....	255	224	244	322	266	322	322
31	255	.....	1,000	299	.....	255	.....	244	.....	277	322	.....

NOTE.—Water over top of gage Dec. 31 to Jan. 2; discharge estimated from elevation of high-water mark and roughly determined gage heights.

Monthly discharge of Reservation drain at Alfalfa, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	266	214	246	15,100
November	277	255	268	15,900
December	1,000	277	344	21,200
January	1,500	299	450	27,700
February	322	266	286	15,900
March	255	224	240	14,800
April	277	214	247	14,700
May	299	224	262	16,100
June	344	266	312	18,600
July	322	255	278	17,100
August	367	266	312	19,200
September	367	299	319	19,000
The year	1,500	214	297	215,000

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TOPPENISH CREEK NEAR FORT SIMCOE, WASH.

LOCATION.—In sec. 26, T. 10 N., R. 16 E., at Olney ranch, 1½ miles below highway bridge, 3½ miles southeast of Fort Simcoe, and about 5 miles southwest of White Swan, Yakima County.

DRAINAGE AREA.—124 square miles (measured on Plate I, Water Supply Paper 369.

RECORDS AVAILABLE.—February 27, 1909, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank half a mile east of ranch house, installed August 19, 1915; inspected by M. W. Schuler and Ivan Hartzell. Previous gages as follows: February 27,1909, to July 22, 1913, chain gage on left bank a quarter of a mile above site of present gage: July 23, 1913, to August 18, 1915, vertical staff attached to cottonwood tree on right bank 150 feet above site of present gage.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders, slightly shifting. Concrete control 18 feet below gage; permanent. Banks subject to overflow at extremely high water. Stage of zero flow, according to measurements made August 14, 1918, gage height 1.78 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.05 feet at 11 p. m. December 18 (discharge, 1,000 second-feet); minimum stage recorded, 2.18 feet at 9.30 a. m. September 8 (discharge, 9 second-feet).

1909–1918: Maximum stage recorded, 5.46 feet at noon May 4, 1916 (discharge, 1,650 second-feet); minimum stage recorded, 0.95 foot January 17, 1915 (discharge, 3.5 second-feet).

ICE.—Stage-discharge relation not affected by ice during current year.

DIVERSIONS.—Nicol and Abe Lincoln ditches diverted from 3 to 6 second-feet above station throughout year. Diversion of spring run-off into reservoir on Simcoe Creek for use in irrigating Indian lands is proposed.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspection of recorder graph; for a few days in December when range in stage was considerable, mean gage heights for shorter intervals were used. Records excellent except during February, for which they are fair.

Discharge measurements of Toppenish Creek near Fort Simcoe, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 12	T. R. Newell	2.45	26.3	Aug. 14	T. G. Bedford	2.26	12.8
Mar. 20	do	3.05	138				

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Daily discharge, in second-feet, of Toppenish Creek near Fort Simcoe, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	14.0	17.8	29	289			256		54	20	13.5	11.0
2	14.0	17.8	28	226		78	232		52	20	14.5	11.5
3	14.0	17.8	27	181	90		203	121	50	19.0	14.0	11.5
4	14.0	18.0	28	184			190		47	19.0	13.5	11.5
5	14.0	18.0	26	163		74	181		46	18.5	13.5	11.5
6	14.0	19.0	26	143		70	175		43	18.5	13.5	11.5
7	14.0	19.0	24	149		69	169		41	17.8	13.0	11.5
8	14.0	20	23	152	210	67	163	125	39	17.8	13.0	11.5
9	14.0	20	23	141		65	169		38	17.8	13.5	12.5
10	14.0	21	23	122		64	190		35	17.1	13.5	12.5
11	14.0	24	23	114		64	197	116	33	15.7	13.0	12.5
12	14.0	25	25	112		64	200	130	32	15.7	12.5	12.5
13	14.0	22	28	104	140	62	190	127	31	15.0	12.5	13.5
14	14.0	21	40	102		58	172	132	31	15.0	12.5	17.8
15	14.0	21	40	99		58	163	160	30	14.5	13.0	16.4
16	14.0	21	51	96		67	152	152	29	18.5	13.0	14.5
17	14.0	21	90	92	118	76	141	141	28	15.7	13.5	13.5
18	15.0	21	418	104	112	124	132	127	27	14.0	13.5	13.5
19	15.0	21	703	104	104	132	127	119	26	14.0	13.5	13.0
20	15.7	21	354	94		132	132	99	26	14.0	14.0	13.0
21	15.0	21	194	92		135	141	102	26	14.0	14.5	12.5
22	15.0	21	260	90		181		94	24	15.7	14.0	12.5
23	15.0	21	253	90		250		87	25	18.5	13.0	13.0
24	15.0	21	184	94	95	253		81	25	21	12.5	13.0
25	15.0	21	146	102		267	150	79	23	17.8	12.0	13.0
26	15.0	21	127	102		270		74	21	17.1	11.5	13.0
27	15.7	21	192	94		250		72	21	15.7	11.0	13.0
28	15.7	23	372	90		226	124	67	21	15.0	11.5	12.5
29	16.4	25	446	87	.....	213	118	64	21	14.5	11.5	12.5
30	17.1	30	372	83	.....	229		58	21	13.5	11.5	12.5
31	17.1	.....	307	80	.....	260	.....	55	.....	13.0	11.0	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated from recorded range of stage weather records, and comparison with Satus and Simcoe creeks. Discharge interpolated; Nov. 4–9, June 30 to July 4.

Monthly discharge of Toppenish Creek near Fort Simcoe, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	17.1	14.0	14.7	904
November	30.	17.8	21	1,250
December	703	23	157	9,650
January	289	80	122	7,500
February	.....	.....	125	6,940
March	270	58	132	8,120
April	256	.....	164	9,760
May	160	55	109	6,700
June	54	21	32.1	1,910
July	21	13.0	16.6	1,020
August	14.5	11.0	12.9	793
September	17.8	11.0	12.8	762
The year	703	11.0	76.5	55,300

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SIMCOE CREEK BELOW SPRING CREEK, NEAR FORT SIMCOE, WASH.

LOCATION.—In sec. 34, T. 11 N., R. 16 E., at site of proposed reservoir, 4 miles northeast of Fort Simcoe, Yakima County.

DRAINAGE AREA.—77 square miles (measured on Plate I, Water-Supply Paper 369).

RECORDS AVAILABLE.—November 20, 1915, to September 30, 1918. For station just above Spring Creek, February 28, 1909, to November 20, 1915.

GAGE.—Stevens continuous water-stage recorder, on left bank just below Spring Creek; inspected by M. W. Schuler and Ivan Hartzell.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; somewhat shifting. Concrete control 16 feet below gage; permanent. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.85 feet at 2 a. m. December 30 (discharge, 296 second-feet); minimum stage recorded, 0.16 foot September 28–30 (discharge, 0.2 second-foot).

1916–1918: Maximum stage recorded, 6.14 feet at 5 p. m. February 10, 1916 (discharge, 731 second-feet); mimimum stage in 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Considerable water is diverted above the station for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table the mean daily gage height determined from recorder graph by inspection; for a few days in December when the range in stage was considerable, mean gage heights for shorter intervals were used. Records good.

Discharge measurements of Simcoe Creek below Spring Creek, near Fort Simcoe, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 13	T. R. Newell	0.36	3.2	Aug. 14	T. G. Bedford	0.27	1.3
Mar. 20	do	.81	34.0				

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Daily discharge, in second-feet, of Simcoe Creek below Spring Creek, near Fort Simcoe, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.3	0.3	2.8	232	29	33	70	26.	13.4	4.4	1.9	0.3
2	.3	.3	2.8	199	30	33	70	27	13.4	4.4	1.9	.3
3	.3	.3	2.5		33	31	66	29	12.8	4.0	1.9	.3
4	.3	.3	2.5	150	34	32	63	30	12.3	3.7	1.7	.3
5	.3	.3	2.5		40	33	62	29	9.6	3.7	1.7	.3
6	.2	.3	2.8		102	32	59	28	9.7	3.7	1.7	.3
7	.2	.4	3.1		97	31	47	28	9.9	3.7	1.5	.3
8	.2	.4	3.4	120	80	31	46	28	10.0	3.4	1.5	.3
9	.2	.4	3.4		77	30	46	24	10.2	3.4	1.5	.3
10	.2	.4	3.4		70	29	46	24	10.3	3.4	1.3	.3
11	.2	.4	3.4		63	31	49	24	10.5	3.4	1.3	.3
12	.2	.6	3.4		60	33	50	24	10.6	3.4	1.1	.3
13	.2	.5	3.4	74	56	31	52	26	9.6	2.5	1.1	.3
14	.2	.5	4.4		52	29	50	28	9.0	2.8	.9	.4
15	.2	.5	5.6		46	29	47	32	9.0	3.1	.8	.3
16	.2	.5	5.6		46	29	46	33	8.1	3.1	.8	.3
17	.2	.5	8.1		46	29	43	33	7.2	3.4	.8	.3
18	.2	.5	71	47	45	31	41	32	6.8	3.4	.8	.3
19	.2	.5	226		42	33	37	30	6.4	2.8	.8	.3
20	.2	.5	162	41	37	34	36	29	6.0	3.1	.9	.2
21	.3	.5	94	41	30	36	34	28	5.6	2.8	.9	.2
22	.3	.5	222	40	36	42	37	25	5.6	2.8	.8	.2
23	.3	.5	196	38	38	49	40	23	5.2	2.8	.8	.2
24	.2	.5	127	40	36	54	41	21	5.2	3.1	.8	.2
25	.3	.5	86	41	33	59	41	20	5.2	2.8	.6	.2
26	.3	.6	66	40	37	62	40	20	4.8	2.8	.5	.2
27	.2	.9	101	40	36	65	38	19	4.8	2.5	.4	.2
28	.3	1.1	220	40	34	63	34	16	4.8	2.5	.5	.2
29	.3	1.7	282	40	.....	62	33	14.5	4.8	2.2	.4	.2
30	.3	2.2	286	38	.....	63	31	13.4	4.8	2.2	.4	.2
31	.3	.....	251	25	.....	66	.....	13.4	.....	2.2	.3	.....

NOTE.—Braced figures show mean discharge for periods indicated, estimated by comparison with Toppenish Creek. Discharge interpolated May 2–3, June 6–11.

Monthly discharge of Simcoe Creek below Spring Creek, near Fort Simcoe, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0.3	0.2	0.25	15.4
November	2.2	.3	.58	34.5
December	286	2.5	79.1	4,860
January	232	25	80.7	4,960
February	102	29	48.8	2,710
March	66	29	40.2	2,470
April	70	31	46.5	2,770
May	33	13.4	25.1	1,540
June	13.4	4.8	8.19	487
July	4.4	2.2	3.15	194
August	1.9	.3	1.04	64.0
September	.4	.2	.27	16.1
The year	286	.2	27.8	20,100

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SATUS CREEK BELOW DRY CREEK, NEAR TOPPENISH, WASH.

LOCATION.—In sec. 24, T. 9 N., R. 19 E., at dam site 1 mile below mouth of Dry Creek and 9 miles southwest of Toppenish, Yakima County.

DRAINAGE AREA.—427 square miles (measured on topographic maps and map of Yakima Indian Reservation).

RECORDS AVAILABLE.—June 22, 1913, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank, inspected by W. H. Walker.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel; shifting. No well-defined control. Stage of zero flow determined by levels, 0.44+0.05 foot on August 12, 1918.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.44 feet at 5 a. m., December 19 (discharge, 1,330 second-feet); minimum stage recorded, 1.23 feet at 7 p. m. July 31 (discharge, 11 second-feet).

1913–1918: Maximum stage recorded, 9.15 feet December 22, 1915 (from high-water marks in well; discharge, 3,870 second-feet); minimum stage recorded, 0.28 foot at 10 p. m. August 28 and 4 a. m. August 30, 1915 (discharge, 6.6 second-feet).

ICE.—Stage-discharge relation not affected by ice during current year.

DIVERSIONS.—Entire flow of Satus Creek above Lazy Creek is diverted for irrigation during July and August; records for low-water summer months show run-off of Lazy and Dry creeks and seepage return from upper Satus Creek.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 18 and again March 23 to April 8. Rating curves well defined. Operation of water-stage recorder unsatisfactory through several long periods as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspection of recorder graph; shifting-control method used March 23 to April 8. Records good except for January and February; January, fair; February, poor.

Discharge measurements of Satus Creek below Dry Creek, near Toppenish, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 14	T. R. Newell	1.55	29.5	Apr. 17	T. R. Newell	2.31	150
Mar. 21	do	3.03	365	Aug. 12	T. G. Bedford	1.31	14.2

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Daily discharge, in second-feet, of Satus Creek below Dry Creek, near Toppenish, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	13	21	32		118	141	268	133	71	20	12	
2	13	21	30			162	248	133	68	20	13	
3	13	22	29			190	232	137	65	20	12	
4	14	23	28	645		181	218	144	62	20	12	
5	14	24	28			162	208	133	58	19	13	1
6	14	22	28			146	195	124	56	19	13	
7	13	22	28	530		144	186	120	54	18	14	
8	14	23	28	444	360	141	183	118	54	18	14	
9	14	22	28	365		137	195	160	50	26	14	14
10	14	22	27	311		133	190	155	46	18	14	13
11	14	23	26	288		135	188	155	45	18	14	13
12	14	25	27			139	181	162	43	18	14	13
13	14	27	26	255		135	176	153	42	16		13
14	14	26	31			128	171	146	39	16		21
15	14	26	41			137	164	150	39	16		22
16	14	26	42			171	157	139	38	17		16
17	16	26	76			213	150	133	36	18		15
18	16	25	289	180		371	141	126	34	14		14
19	17	25	1,130			409	135	120	32	14		14
20	18	25	614			356	133	116	31	14		14
21	17	25	365		175	359	133	110	28	14		14
22	16	25				417	135	108	28	15	14	14
23	17	26	575	150		495	141	104	29	16		15
24	17	26				422	141	101	28	16		16
25	18	26				425	139	97	26	16		16
26	18	25				390	137	95	25	15		16
27	18	25			148	359	135	90	23	14		16
28	18	25	870	130	141	332	135	81	22	14		15
29	20	28			.....	305	133	78	22	13		15
30	20	30			.....	296	133	76	22	12		15
31	20	.....			.....	288	.....	73	.....	12		.....

NOTE.—Braced figures show mean discharge for period indicated; estimated as follows: Dec. 22 to Jan. 6, from partial gage-height record; Jan. 12-31, from hydrographic comparison with Toppenish Creek; Feb. 2-26, from hydrographic comparison with Simcoe Creek; Apr. 13, 15-16, Aug. 4-7, 9-11, and Aug. 13 to Sept. 8, estimated.

Monthly discharge of Satus Creek below Dry Creek, near Toppenish, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	20	13	15.7	965
November	30	21	24.6	1,460
December	1,130	26	338	20,800
January	.....	.....	315	19,400
February	.....	.....	263	14,600
March	495	128	252	15,500
April	268	133	169	10,100
May	162	73	122	7,500
June	71	22	40.5	2,410
July	26	12	16.6	1,020
August	.....	.....	13.7	842
September	22	.....	14.9	887
The year	1,130	.....	132	95,500

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MISCELLANEOUS DISCHARGE MEASUREMENTS.

In addition to the records of stream flow obtained at gaging stations and reported in the preceding pages, measurement of flow were made at a number of other points, as shown by the following table:

Miscellaneous discharge measurements in drainage basins in Washington, for the year ending Sept. 30, 1918.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
			Nisqually River drainage basin.		
				Feet.	*Sec.-ft.*
June 25	East Creek	Nisqually River	Proposed gaging station at Lutkens ranch, 1½ miles above mouth, Wash.		4.8
			Puyallup River drainage basin.		
Dec. 19	Puyallup River	Puget Sound	County highway bridge near Indian school in Tacoma, Wash.		25,200
29	do	do	do		31,000
Jan. 3	do	do	do		12,700
14	do	do	do		8,550
			Skagit River drainage basin.		
June 26[a]	Thunder Creek	Skagit River	Gaging station one-quarter mile above mouth, Wash.	9.04	1,700
Sept. 21[a]	do	do	do	3.64	735
June 16	Stetattle Creek	do	do	2.51	260
20[a]	do	do	do	2.64	331
Sept. 18[a]	do	do	do	1.60	83
June 18[a]	Newhalem Creek	do	do	10.00	295
Sept. 20[a]	do	do	do	8.50	53
June 17	Goodell Creek	do	1 mile above mouth, Wash	9.87	712
			Clark Fork drainage basin.		
Aug. 1	Swan River	Flathead Lake	Big Fork, Mont	395.12	1,020
			Kettle River drainage basin.		
Apr. 21	Lambert Creek	Curlew Creek	Mouth, Wash		3.7

[a] Furnished by city of Seattle.

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ALBERT B. FALL, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 483

SURFACE WATER SUPPLY OF THE UNITED STATES
1918

PART XII. NORTH PACIFIC DRAINAGE BASINS

B. SNAKE RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
G. C. BALDWIN, G. L. PARKER, A. R. PURTON, and F. F. HENSHAW
District Engineers

Prepared in cooperation with the States of
OREGON, NEVADA, AND WASHINGTON

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SURFACE WATER SUPPLY OF SNAKE RIVER BASIN, 1918.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting results of measurements of flow made on streams in the United States during the year ending September 30, 1918.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

Provided, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies relating to irrigation in the arid west. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ending June 30, 1895–1919.

1895	$12,500.00
1896	20,000.00
1897 to 1900, inclusive	50,000.00
1901 to 1902, inclusive	100,000.00
1903 to 1906, inclusive	200,000.00
1907	150,000.00
1908 to 1910, inclusive	100,000.00
1911 to 1917, inclusive	150,000.00
1918	175,000.00
1919	148,244.00

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 5.

Measurements of stream flow have been made at about 4,510 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1918, 1,180 gaging stations were

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being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular water-supply papers from time to time.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miners' inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, and acre-feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth of inches.

An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

"Stage-discharge relation"; an abbreviation for the term "relation of gage height to discharge."

"Control"; a term used to designate the natural section or stretch of the channel or artificial structure below the gage which determines the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

The "point of zero flow" for a gaging station is that point on the gage—the gage height—to which the surface of the stream falls when the discharge is reduced to zero.

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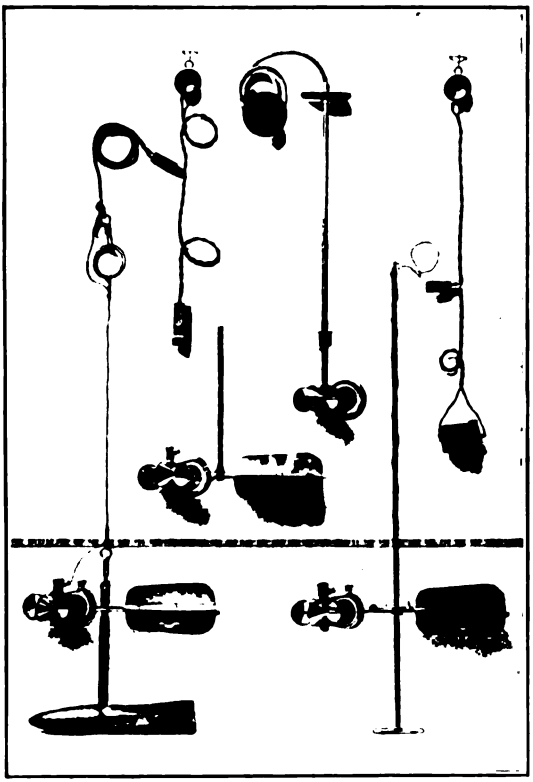

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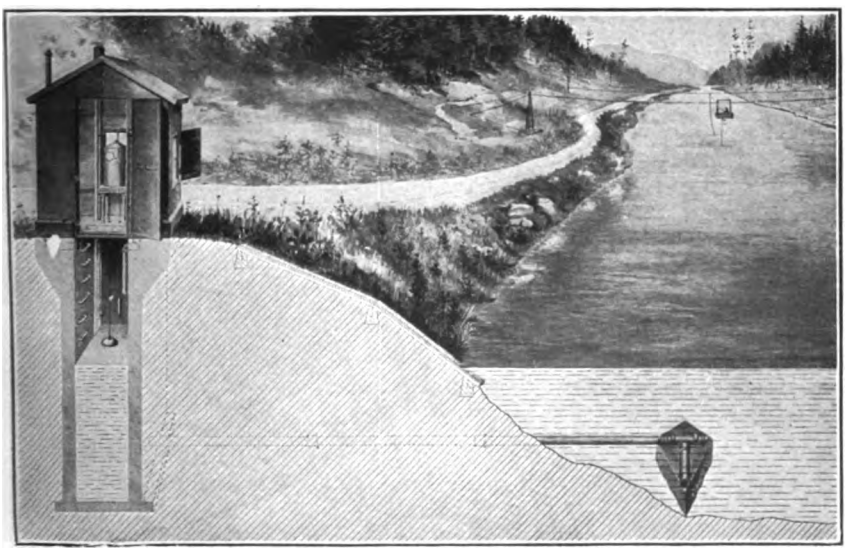

B. TYPICAL GAGING STATION.

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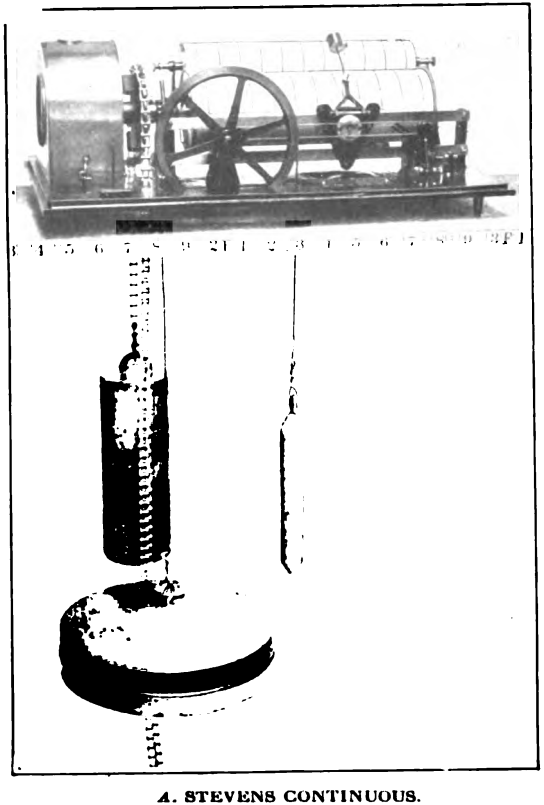

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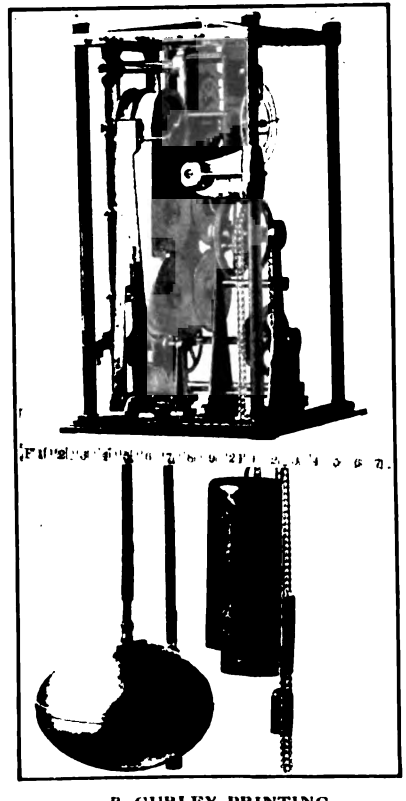

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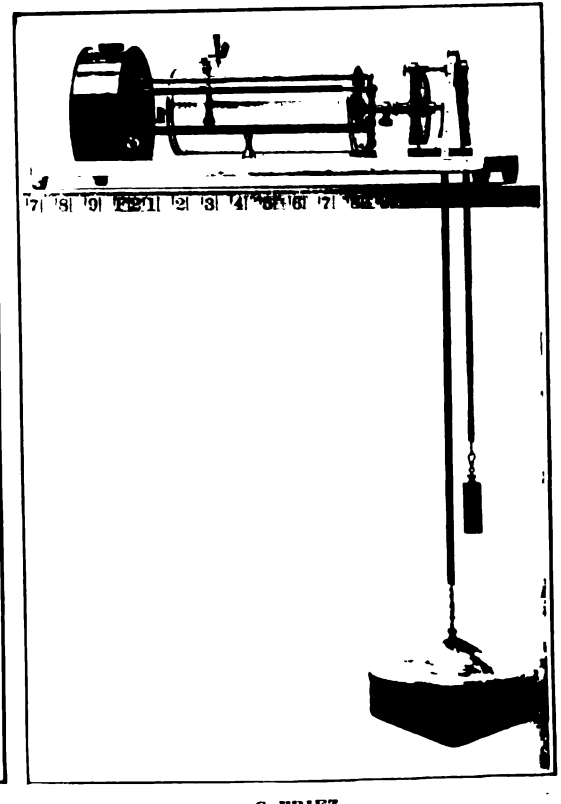

C. FRIEZ.

WATER-STAGE RECORDERS.

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EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1917, and ending September 30, 1918. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff or chain gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter. (See Pls. I, II.) The general methods are outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to gage heights, give the daily discharge from which the monthly and yearly means of discharge are determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving results of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage height and results of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanence of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of channel, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the

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mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the mean daily discharge may be obtained by averaging quantities of discharge for regular intervals during the day, or by means of a discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet per second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 2 are based.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of stream-flow data depends primarily (1) on the permanence of the stage-discharge relation and (2) on the accuracy of observation of stage, measurement of flow, and interpretation of records.

A paragraph in the description of the station gives information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying the daily gage height to the rating table to obtain the daily discharge.[1]

For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and run-off in inches may be subject to gross errors caused by the inclusion of large noncontributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of

[1] For a more detailed discussion of the accuracy of records see Grover, N. C., and Hoyt, J. C. Accuracy of stream-flow data: U. S. Geol. Survey Water-Supply Paper 400, pp. 53-59, 1916.

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the river above the station. "Second-feet per square mile" and "run-off in inches" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off in inches" previously published by the Survey should be used with caution because of possible inherent sources of error not known by the Survey.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

During the year ending September 30, 1918, work in the Snake River basin was carried on in cooperation with the States of Oregon, Nevada, and Washington, effected under contracts made between the Director of the Federal Survey and the State engineers or other officials and authorized by legislative acts appropriating money.

Special acknowledgments are due to John H. Lewis, State engineer of Oregon; to Henry Landes, State geologist of Washington; and to J. G. Scrugham, State engineer of Nevada, for the efficient manner in which they represented their States in the investigations.

Acknowledgments are due also to the United States Reclamation Service and the United States Office of Indian Affairs, which permitted the freest use of data gathered exclusively for them and paid for by them. The United States Weather Bureau and the officials of Yellowstone National Park furnished hydrometric and climatic data.

The following cities, private companies, and individuals have aided in the collection of records by paying the expense of work or otherwise assisting: City of Pocatello, Twin Falls Canal Co., and Twin Falls North Side Land & Water Co.

DIVISION OF WORK.

The data for stations in Nevada were collected and prepared for publication under the direction of C. C. Jacob and A. B. Purton, district engineers, who were assisted by L. W. Jordan, W. E. Dickinson, J. W. Bones, and Miss Ruby Christensen.

For stations in Idaho (except in the Clearwater and upper Columbia basins), in Wyoming and in the Salmon Falls Creek basin in Nevada, the data were collected under the direction of G. C. Baldwin, district

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engineer, and prepared for publication under the direction of G. C. Baldwin and C. G. Paulsen, district engineers, who were assisted by H. J. Dean, William Kessler, T. R. Newell, E. C. Howard, R. B. Kilgore, C. W. Kief, C. E. Tappan, C. F. Elford, A. G. Fiedler, B. A. Howell, A. G. Hewel, Miss E. H. Haugse, Miss E. M. Klemm, and Mrs. F. G. Cure.

Data for stations in Oregon were collected and prepared for publication under the direction of F. F. Henshaw, district engineer, who was assisted by C. L. Batchelder and R. C. Briggs.

For stations in Washington and in the Palouse River basin in Idaho records were collected and prepared for publication by G. L. Parker, district engineer, assisted by Lasley Lee, W. E. Dickinson T. R. Newell, L. D. Carson, R. B. Kilgore, and E. C. Howard.

The manuscript was reviewed and assembled by Robert Follansbee and B. J. Peterson.

GAGING-STATION RECORDS.

SNAKE RIVER.

SNAKE RIVER AT SOUTH BOUNDARY OF YELLOWSTONE NATIONAL PARK.

LOCATION.—A quarter of a mile below junction of Lewis and Snake rivers, half a mile north of Snake River soldier station and south boundary of Yellowstone National Park, and 25 miles north of Moran, Wyo.

DRAINAGE AREA.—490 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 19, 1913, to September 30, 1918.

GAGE.—Overhanging chain gage on right bank; read by G. L. Van Norman and W. J. Burns. Auxiliary chain gage on bridge about 2½ miles downstream, used August 4 to September 2 and September 4–14; read by Ed Sheffield.

DISCHARGE MEASUREMENTS.—Made from cable about 225 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel; clean except for occasional lodgment of drift. Control probably permanent at ordinary stages. One channel at gage but divided by an island into two channels at control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.65 feet on May 14 (discharge, 1,350 second-feet); minimum stage recorded, 1.9 feet November 10–15 and 20–26 (discharge, 279 second-feet).

1913–1918: Maximum stage recorded, 6.3 feet June 2, 1914 (discharge, 5,690 second-feet); minimum stage recorded, 1.4 feet October 26–31, 1915 (discharge, 160 second-feet).

ICE.—Stage-discharge relation not affected by ice, the formation of which is evidently prevented by hot springs above the gage.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined between 250 and 5,000 second-feet by measurements in 1916 and 1917. Two parallel curves used. Rating curve for auxiliary gage record based on two measurements made in 1918. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating tables. Records fair.

COOPERATION.—Gage-height record furnished by superintendent of Yellowstone National Park and by the United States Reclamation Service.

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Discharge measurements of Snake River at south boundary of Yellowstone National Park, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 3	William Kessler	2.33	414
July 21	T. R. Newell	[a] 3.28	896
Sept. 3	G. C. Baldwin	[b] 2.34	385

[a] Sheffield gage at highway bridge read 3.67 feet. [b] Sheffield gage at highway bridge read 2.72 feet.

Daily discharge, in second-feet, of Snake River at south boundary of Yellowstone National Park, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	416	360	448	496	381	381	360	710	.....	.....	764	415
2	462	360	360	496	381	360	381	681	.....	.....	734	376
3	412	360	360	472	360	360	368	625	.....	.....	703	385
4	403	360	360	448	381	360	360	710	.....	.....	673	376
5	360	360	360	448	360	360	368	740	.....	.....	673	376
6	408	360	368	448	394	381	381	802	.....	.....	592	356
7	360	318	360	426	381	381	381	867	.....	.....	592	356
8	360	318	381	412	403	360	368	867	.....	.....	592	398
9	408	298	360	412	394	360	403	771	.....	.....	565	465
10	403	279	318	426	408	360	403	867	.....	.....	514	376
11	360	279	360	403	394	360	412	935	.....	.....	514	376
12	360	279	381	381	412	381	426	1,050	.....	.....	490	368
13	318	279	403	408	394	360	403	1,260	.....	.....	465	368
14	360	279	403	408	381	381	426	1,350	.....	.....	465	398
15	330	279	381	381	360	381	403	1,260	.....	.....	490	.....
16	360	310	408	412	360	403	426	1,010	.....	.....	514	.....
17	360	318	408	426	368	403	426	985	.....	.....	514	.....
18	381	318	381	408	381	381	403	971	.....	.....	490	.....
19	403	298	403	426	403	381	403	.....	.....	.....	490	.....
20	408	279	403	403	403	360	426	.....	.....	.....	465	.....
21	360	279	381	412	381	381	403	.....	.....	880	465	.....
22	360	279	403	394	360	360	403	.....	.....	915	465	.....
23	318	279	426	394	381	360	368	.....	.....	1,230	465	.....
24	318	279	448	403	360	381	394	.....	.....	949	442	.....
25	360	279	448	412	360	360	412	.....	.....	771	442	.....
26	318	279	448	403	381	360	426	.....	.....	915	442	.....
27	318	298	448	412	403	394	403	.....	.....	915	419	.....
28	360	298	496	403	360	403	520	.....	.....	885	419	.....
29	318	298	496	426	.....	394	598	.....	.....	854	419	.....
30	360	339	520	403	.....	381	652	.....	.....	824	419	.....
31	360	.....	545	403	.....	360	.....	.....	.....	794	415	.....

NOTE.—No record obtained May 19 to July 20 and Sept. 15-30. Record Aug. 4 to Sept. 2 and Sept. 4-14 from auxiliary gage 2½ miles downstream.

Monthly discharge of Snake River at south boundary of Yellowstone National Park, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	462	318	368	22,600
November	360	279	307	18,300
December	545	318	408	25,100
January	496	381	419	25,800
February	412	360	381	21,200
March	403	360	374	23,000
April	652	360	417	24,800
May 1-18	1,350	625	912	32,600
July 21-31	1,230	771	903	19,700
August	764	415	520	32,000
September 1-14	465	356	385	10,700

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JACKSON LAKE AT MORAN, WYO.

LOCATION.—In sec. 18, T. 45 N., R. 114 W., a short distance above gates at outlet of lake at Moran, Lincoln County.

RECORDS AVAILABLE.—June 1, 1909, to September 30, 1918. Records for years 1909 and 1910 fragmentary.

GAGE.—Inclined staff on right shore just below engineers' cottage. Zero of gage, 6,700 feet above sea-level.

COOPERATION.—Gage-height record and table showing storage capacity of the lake furnished by United States Reclamation Service.

Jackson Lake impounds water for the irrigation of lands in the Minidoka and Twin Falls tracts. It has a capacity of 847,000 acre-feet between the elevations 6,730 and 6,769 feet sea-level datum.

Daily contents, in acre-feet, of Jackson Lake at Moran, Wyo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1...	342,740	365,490	387,140	429,700	460,780	488,090	514,450	547,110	718,120	796,260	657,850	281,310
2...	344,050	366,360	388,470	430,370	461,700	488,780	515,850	549,450	725,020	796,770	647,440	273,560
3...	345,350	367,240	389,800	431,050	462,850	489,470	516,540	552,250	732,440	797,280	637,100	265,180
4...	346,220	368,120	391,130	432,630	463,990	490,160	517,010	556,020	743,560	796,260	623,640	254,410
5...	347,080	369,000	392,240	433,980	465,140	490,860	517,940	560,260	756,240	796,240	606,680	243,860
6...	347,950	369,870	393,350	434,660	466,280	491,780	518,630	566,150	765,710	796,770	587,900	233,040
7...	348,820	370,530	394,460	435,330	467,430	492,700	519,330	570,620	767,700	796,260	568,500	222,840
8...	349,700	371,410	395,580	436,010	468,120	493,860	519,800	575,340	770,940	795,760	550,850	213,390
9...	350,570	372,300	396,700	436,910	468,580	494,550	520,490	582,680	771,180	797,530	532,130	205,140
10...	351,220	372,960	398,040	438,040	469,260	495,240	521,420	586,480	774,700	796,260	512,360	196,190
11...	351,890	373,850	399,380	438,950	469,950	496,390	522,820	588,850	778,460	796,260	492,700	186,860
12...	352,550	374,520	400,280	439,860	470,640	498,240	523,750	592,170	780,210	796,770	478,890	178,820
13...	353,210	375,180	401,170	440,770	471,550	499,860	524,680	597,150	782,720	796,770	463,990	171,220
14...	353,860	375,840	402,510	441,680	472,240	500,550	525,840	602,140	786,230	797,020	449,180	165,180
15...	354,520	376,510	403,860	442,590	472,930	501,470	527,700	609,070	788,740	796,010	436,010	159,010
16...	355,180	377,170	404,750	443,730	473,620	502,160	528,630	614,080	790,240	794,260	423,150	153,830
17...	355,840	377,840	405,640	444,860	474,990	502,860	529,790	617,190	792,250	796,000	409,670	154,210
18...	356,500	378,500	406,990	446,000	476,370	503,550	530,960	625,080	792,500	791,000	397,370	154,600
19...	357,150	379,170	408,330	446,910	477,510	504,240	531,430	628,200	794,260	788,490	387,800	155,560
20...	357,810	379,830	409,670	447,360	478,660	504,930	532,130	633,490	796,010	785,980	379,170	156,320
21...	358,470	380,500	411,010	448,280	479,800	505,860	533,070	637,580	796,260	784,480	369,000	157,290
22...	359,130	381,160	412,350	449,410	480,720	506,550	534,000	642,390	796,770	779,460	359,350	158,240
23...	359,570	381,820	413,690	450,550	481,410	507,250	535,170	648,400	796,260	774,700	350,360	159,200
24...	360,000	382,490	415,040	451,690	482,550	507,940	536,340	655,910	797,530	769,690	342,310	160,160
25...	360,440	383,150	416,390	452,820	483,700	508,870	537,750	664,140	795,010	764,010	334,500	161,310
26...	360,880	383,820	419,090	453,960	485,080	509,340	540,320	672,620	795,760	754,750	326,910	162,460
27...	361,320	384,480	421,800	454,870	486,470	510,040	541,720	678,960	795,760	736,640	318,110	163,620
28...	361,980	385,150	424,280	455,780	487,620	511,200	543,130	685,790	795,260	717,630	312,310	164,790
29...	362,850	385,810	427,210	457,370	.....	511,900	544,300	692,370	795,260	700,200	305,020	165,960
30...	363,730	386,480	428,340	459,190	.....	512,360	545,940	698,230	797,530	681,150	297,390	167,130
31...	364,610	.....	429,020	460,100	.....	513,060	.....	708,300	.....	669,230	289,540	.....

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SNAKE RIVER NEAR MORAN, WYO.

LOCATION.—In sec. 17, T. 45 N., R. 114 W., 1½ miles below Moran post office, Lincoln County, and United States Reclamation Service dam at outlet of Jackson Lake. No important tributaries between dam and station.

DRAINAGE AREA.—820 square miles.

RECORDS AVAILABLE.—September 21, 1903, to September 30, 1918.

GAGE.—Inclined staff on left bank. Datum lowered 1.0 foot July 26, 1915. Stevens 8-day water-stage recorder installed June 14, 1917, on bank to rear of staff gage. Gage read by employees of United States Reclamation Service.

DISCHARGE MEASUREMENTS.—Made from cable about 100 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.41 feet at 8 p. m. June 12 (discharge, 15,100 second-feet); minimum stage recorded, 0.43 foot at 1 a. m. September 26 (discharge, 22 second-feet).

1903–1918: Maximum stage recorded, 10.41 feet at 8 p. m. June 12, 1918 (discharge, 15,100 second-feet); practically no flow during a few days in 1907 and 1909 as a result of closing of gates in Jackson Lake dam.

ICE.—Stage-discharge relation affected by ice. Gates in dam at Jackson Lake are closed during winter. Flow past gage represents leakage through dam and inflow from springs.

DIVERSIONS.—None between dam and station and practically none above Jackson Lake.

REGULATION.—Flow controlled by operation of gates in Jackson Lake dam. Storage capacity of reservoir 847,000 acre-feet.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths once daily October 16 to May 12. Operation of water-stage recorder satisfactory for rest of year. Daily discharge ascertained by applying daily gage height to rating table except for period June 1 to September 30, when discharge given is the mean of hourly discharges as determined from gage-height graph and rating table. Records fair for periods of ice effect; excellent for rest of year.

COOPERATION.—Gage-height record furnished by United States Reclamation Service.

Discharge measurements of Snake River near Moran, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 5	William Kessler	0.71	42.9	Aug. 8	T. R. Newell	8.96	11,000
5	do	.71	42.2	10	do	8.41	9,690
June 11	T. R. Newell	10.28	15,000	23	do	6.30	5,620
11	do	10.29	14,700	24	do	5.83	4,800
20	do	5.54	4,270	Sept. 2	Newell and Baldwin	5.80	4,780
20	do	5.88	4,780	11	T. R. Newell	6.29	5,510
July 20	do	4.65	2,950	23	do	.48	24.1
22	do	1.25	168	24	do	.45	22.9
22	do	1.17	141				
24	do	5.38	4,080				

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Daily discharge, in second-feet, of Snake River near Moran, Wyo., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	45	36	34	35	.....	49	41	65	72	4,620	7,190	4,800
2	45	36	34	35	.....	49	40	72	67	3,680	7,090	4,690
3	43	35	34	34	.....	49	40	78	55	4,330	7,520	5,180
4	43	35	34	34	.....	49	39	87	55	4,090	9,270	6,200
5	42	35	34	33	.....	49	38	70	1,460	2,710	10,520	6,040
6	42	35	34	33	.....	49	38	70	4,690	4,120	11,500	5,880
7	42	35	34	.....	.....	49	37	61	8,950	3,640	11,200	5,660
8	42	35	34	.....	.....	49	37	65	9,310	2,440	11,120	5,480
9	41	35	34	.....	42	49	37	65	11,280	2,610	10,860	5,320
10	41	35	34	.....	42	49	38	65	10,940	3,300	10,190	5,450
11	41	35	34	.....	42	49	38	65	14,350	2,170	9,840	5,390
12	40	35	34	.....	43	49	38	69	14,440	2,160	9,350	4,380
13	40	35	34	.....	43	49	38	55	14,720	2,050	8,460	4,280
14	40	35	34	.....	45	49	39	56	14,560	2,970	8,310	4,170
15	40	35	34	.....	45	49	39	58	14,040	2,920	8,180	4,080
16	39	35	34	.....	46	49	39	60	14,070	3,000	8,060	2,590
17	39	35	35	.....	46	49	40	61	12,630	3,000	7,750	32
18	39	35	35	.....	46	50	40	60	11,970	3,000	6,940	26
19	39	35	35	.....	48	50	40	52	9,410	2,990	5,540	24
20	38	35	35	.....	48	52	40	49	11,180	2,940	5,680	23
21	38	35	35	.....	49	52	40	49	8,980	2,740	5,760	23
22	38	35	35	.....	49	53	40	50	10,070	3,500	5,700	22
23	38	35	36	.....	49	53	40	50	10,300	4,480	5,350	23
24	38	35	36	.....	49	42	40	50	12,920	3,920	4,740	23
25	38	35	36	.....	49	42	40	50	9,640	4,520	4,690	23
26	38	35	36	.....	49	42	41	50	7,420	8,230	4,600	23
27	37	35	36	.....	49	42	41	61	6,850	10,990	4,580	23
28	37	35	36	.....	49	42	45	72	6,100	11,200	4,490	23
29	37	35	36	.....	.....	42	52	78	3,050	11,170	4,440	23
30	37	35	35	.....	.....	42	58	69	4,320	10,070	4,540	24
31	36	.....	35	.....	.....	42	.....	72	.....	7,230	4,910	.....

NOTE.—Stage-discharge relation affected by ice Jan. 7 to Feb. 8. Gates in dam at Jackson Lake remained closed but the leakage through the gates increased, owing to increasing head on gates. Mean discharge estimated as follows: Jan. 7–31, 36 second-feet; Feb. 1–8, 40 second-feet.

Monthly discharge of Snake River near Moran, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	45	36	39.8	2,450
November	36	35	35.1	2,090
December	36	34	34.7	2,130
January	.....	.....	35.6	2,190
February	.....	.....	44.6	2,480
March	53	42	47.7	2,930
April	58	37	40.4	2,400
May	87	49	62.4	3,840
June	14,720	55	8,600	512,000
July	11,200	2,050	4,540	279,000
August	11,500	4,440	7,370	453,000
September	6,200	22	2,660	158,000
The year	14,720	22	1,970	1,420,000

SNAKE RIVER AT ALPINE, IDAHO.

LOCATION.—In T. 3 S., R. 46 E., 300 yards below ranch house and 1 mile below highway bridge at Alpine, Bonneville County, and Idaho-Wyoming State line. Salt River enters just above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 20, 1916, to September 30, 1918.

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GAGE.—Stevens 8-day water-stage recorder installed June 2, 1917, on right bank; also vertical staff in two sections at same site. Gage inspected by William Kizer and C. W. Kief.

DISCHARGE MEASUREMENTS.—Made from cable 200 feet downstream from gage.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. One channel at all stages. Control shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 12.67 feet at 10 p. m June 15 (discharge, 49,200 second-feet); minimum stage undoubtedly occurred during that portion of the year for which no records are available.

1916–1918: Maximum stage recorded, that of June 15, 1918; minimum stage, 2.70 feet at 9 a. m. November 15 and 16, 1916 (discharge, 2,130 second-feet).

ICE.—Stage-discharge relation affected by ice; observations discontinued during winter.

DIVERSIONS.—None above station.

REGULATION.—Flow controlled by storage at Jackson Lake reservoir, which was completed during 1918 to a capacity of about 847,000 acre-feet.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined between 4,000 and 33,000 second-feet. Several parallel curves used. Operation of water-stage recorder satisfactory except for one short period. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or by shifting-control method. Records fair for June; good for rest of period.

Discharge measurements of Snake River at Alpine, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 3	T. R. Newell	3.17	3,740	Aug. 17	C. W. Kief	6.55	13,000
June 5	Baldwin and Howard	7.23	17,300	24	do	5.45	9,120
July 5	C. W. Kief	6.99	16,700	29	do	5.19	8,300
12	do	6.28	12,300	Sept. 5	do	5.61	9,700
17	do	6.30	12,500	8	do	5.44	9,230
24	do	6.00	11,000	16	do	4.98	7,770
26	do	6.07	11,100	18	do	3.64	3,750
Aug. 2	do	6.51	13,100	22	do	3.47	3,400
9	Kief and Baldwin	7.21	15,700	30	do	3.40	3,140
12	C. W. Kief	7.01	14,900				

Daily discharge, in second-feet, of Snake River at Alpine, Idaho, for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		19,300	12,600	8,530	16	48,100	13,200	13,000	7,740
2		18,300	12,600	8,360	17		12,300	13,000	5,800
3		17,800	12,600	8,360	18		11,900	11,700	3,750
4		17,800	13,900	9,030	19		11,500	10,900	3,570
5	17,200	16,800	14,900	9,730	20		11,500	10,100	3,480
6	21,900	16,100	16,400	9,730	21		11,100	10,100	3,390
7	27,000	16,900	16,400	9,380	22		10,700	10,100	3,390
8	27,600	15,800	16,400	9,200	23		11,100	9,730	3,390
9	33,600	13,700	15,900	9,380	24		11,500	9,380	3,390
10	36,600	14,900	15,400	9,200	25		11,000	8,860	3,390
11	40,800	13,800	14,900	9,200	26		11,200	8,690	3,350
12	45,100	12,300	14,900	8,690	27		15,700	8,530	3,320
13	46,300	11,900	13,500	7,890	28		17,200	8,360	3,200
14	48,100	12,800	13,000	7,740	29		17,200	8,200	3,170
15	48,700	14,100	13,500	7,890	30		17,200	8,200	3,130
					31		14,600	8,360	

NOTE.—No record obtained Oct. 1 to May 31. Discharge estimated June 1–4, 13,000 second-feet: June 17–30, 37,000 second-feet.

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Monthly discharge of Snake River at Alpine, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June	48,700	.....	33,700	2,010,000
July	19,300	10,700	14,200	873,000
August	16,400	8,200	12,100	744,000
September	9,730	3,130	6,330	377,000
The period	.....	.....	.....	4,000,000

SNAKE RIVER NEAR HEISE, IDAHO.

LOCATION.—In sec. 5, T. 3 N., R. 41 E., 600 feet above Anderson dam, in Bonneville County, 3 miles above Heise, and 25 miles below site of station formerly maintained near Lyon. Several small creeks enter between old site and station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 25, 1910, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank; installed July 8, 1913, and referred to vertical staff gage. Gage inspected by J. T. Morgan, W. J. Kremer, and E. C. Howard.

DISCHARGE MEASUREMENTS.—Made from cable about 100 feet below gage.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and cobblestones. One channel at all stages. Control formed by crest of Anderson dam. Part of this dam washed out during high water June 13–24, following which the control shifted at frequent intervals.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.10 feet at 9 a. m. June 13. Maximum discharge, about 52,000 second-feet June 16; minimum stage recorded, 0.34 foot September 29 (discharge, 3,880 second-feet). Actual minimum probably occurred during period of no record.

1910–1918: Maximum discharge, about 52,000 second-feet June 16, 1918; minimum discharge, 2,180 second-feet at 10 a. m. March 10, 1915.

ICE.—Stage-discharge relation seriously affected by ice. Observations discontinued during winter.

DIVERSIONS.—No large diversions above station. A small ditch of about 20 second-feet capacity takes out just above this station.

REGULATION.—Flow controlled to a large extent by storage in Jackson Lake reservoir.

ACCURACY.—Stage-discharge relation changed during high water in June by washing out of Anderson dam. Standard rating curve used before the change well defined between 4,000 and 20,000 second-feet. Several parallel rating curves used after the change. Operation of water-stage recorder satisfactory except April 9–20 and June 11 to July 1. Daily discharge ascertained by applying mean daily gage height to rating table except June 1–10 and July 1 to September 30, when the mean of hourly discharge was used. Records good.

Discharge measurements of Snake River near Heise, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 9	C. F. Elford	1.80	4,310	Aug. 3	E. C. Howard	3.23	13,500
10	do	2.10	4,990	5	do	3.73	15,100
11	do	2.40	5,730	13	Baldwin and Howard	3.48	13,700
May 21	G. C. Baldwin	4.04	11,300	15	E. C. Howard	3.52	13,600
June 9	Baldwin and Howard	9.04	40,100	17	do	3.42	12,900
29	E. C. Howard	5.60	25,500	27	do	2.26	8,860
July 12	G. C. Baldwin	3.32	13,200	28	do	2.22	8,660
15	E. C. Howard	3.66	14,400	31	do	2.11	8,190
16	do	3.48	13,500	Sept. 13	do	2.06	8,250
19	do	3.12	12,300	14	do	2.02	7,950
Aug. 1	do	3.31	13,200	17	do	1.92	8,270
2	do	3.26	13,300	23	G. C. Baldwin	.46	4,010

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Daily discharge, in second-feet, of Snake River near Heise, Idaho, for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	8,840	15,430	20,320	13,350	8,780	16	6,280	.....	51,600	14,070	13,360	7,950
2	.....	9,570	14,680	20,030	13,150	8,730	17	6,000	.....	50,400	13,360	13,320	7,460
3	.....	11,600	14,880	19,020	13,050	8,670	18	5,470	12,400	48,000	12,720	12,810	4,890
4	.....	13,800	16,970	19,310	13,450	8,820	19	5,220	12,000	46,200	12,270	11,870	4,340
5	.....	15,700	19,670	18,060	15,020	10,060	20	4,960	11,200	43,200	12,000	10,520	4,220
6	.....	15,700	24,010	16,540	15,930	9,940	21	4,980	11,200	43,200	11,800	10,340	4,160
7	.....	15,200	29,250	18,100	16,640	9,720	22	5,340	12,100	42,000	11,060	10,380	4,090
8	.....	15,200	35,610	16,680	16,460	9,450	23	6,280	12,900	41,400	11,550	10,240	4,060
9	4,320	15,700	38,130	14,870	16,210	9,500	24	6,570	13,800	41,400	11,950	9,950	4,100
10	4,980	14,300	41,670	14,820	15,900	9,340	25	7,020	14,800	42,000	11,250	9,260	4,040
11	5,730	12,000	43,800	15,120	15,410	9,320	26	7,820	14,800	37,300	11,640	9,080	4,000
12	6,570	.....	49,200	13,490	14,890	9,160	27	7,500	14,300	33,200	14,500	8,970	3,960
13	7,500	.....	49,800	12,680	14,380	8,190	28	6,870	13,400	30,900	17,590	8,770	3,920
14	7,820	.....	50,400	13,190	13,390	8,050	29	6,870	12,900	26,300	17,550	8,590	3,880
15	7,180	.....	51,600	14,650	13,750	8,040	30	7,660	12,900	22,300	17,340	8,480	3,880
							31	.....	14,800	.....	16,360	8,460	.....

NOTE.—No record obtained Oct. 1 to Apr. 8. Discharge estimated 12,000 second-feet, May 12-17.

Monthly discharge of Snake River near Heise, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 9-30	7,820	4,320	6,320	276,000
May	15,700	8,840	13,000	799,000
June	51,600	14,680	36,500	2,170,000
July	20,320	11,060	15,000	922,000
August	16,640	8,460	12,400	762,000
September	10,060	3,880	6,820	406,000
The period				5,340,000

SNAKE RIVER NEAR SHELLEY, IDAHO.

LOCATION.—In sec. 17, T. 1 N., R. 37 E., a quarter of a mile upstream from Woodville highway bridge and 3 miles north of Shelley, Bingham County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 18, 1915, to September 30, 1918.

GAGE.—Friez water-stage recorder on right bank, standard hook gage in float well, and combination vertical and inclined staff gage outside. Observer, James Thorne.

DISCHARGE MEASUREMENTS.—Made from cable 600 feet upstream from gage.

CHANNEL AND CONTROL.—Control is a lava-rock reef extending across the channel about 500 feet below gage. Banks high and clean at gage and control.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 16.97 feet at 1.30 p. m. June 17 (discharge, 47,200 second-feet); minimum stage, 6.20 feet at 12 p. m. September 30 (discharge, 3,810 second-feet); absolute minimum stage probably occurred during period of no record.

1915-1918: Maximum stage from water-stage recorder, that of June 17, 1918; minimum stage, 4.88 feet at 6 p. m. September 2, 1915 (discharge, 1,800 second-feet).

ICE.—Stage-discharge relation probably seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Practically the entire natural summer flow of the river above the station is appropriated by numerous diversions in the Idaho Falls district.

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REGULATION.—Natural flow during the irrigation season is augmented by the release of stored flood waters in Jackson Lake for use on the Minidoka project and Twin Falls tracts.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

Discharge measurements of Snake River near Shelley, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	T. R. Newell	6.52	4,560	June 12	G. C. Baldwin	14.55	37,200
Apr. 12	C. F. Elford	7.05	6,610	July 11	do	8.64	11,600
May 19	Newell and Baldwin	8.52	11,500	Sept. 21	do	6.52	4,690

Daily discharge, in second-feet, of Snake River near Shelley, Idaho, for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	5,430	9,000	14,200	19,000	9,000	6,500	16	8,310	13,000	46,000	13,800	10,100	7,800
2	5,580	10,100	15,000	17,000	7,640	6,660	17	7,800	13,000	46,900	13,400	10,400	7,800
3	5,580	11,200	14,600	15,400	7,470	6,660	18	6,820	12,300	46,900	12,300	10,800	7,140
4	5,280	13,000	14,600	14,600	7,470	6,660	19	5,880	11,200	45,100	11,200	10,400	5,580
5	4,850	15,000	16,200	14,600	8,310	6,820	20	5,580	10,400	42,800	10,400	9,350	4,850
6	4,710	17,000	18,600	13,400	9,350	7,300	21	5,430	9,350	41,000	9,700	8,480	4,710
7	4,440	17,000	22,700	12,300	10,400	7,300	22	5,880	8,830	39,600	8,480	8,310	4,710
8	4,310	17,000	26,100	13,000	11,200	7,300	23	6,500	8,660	39,600	7,470	8,310	4,710
9	4,180	17,800	29,900	12,300	11,200	7,470	24	7,300	8,830	39,200	7,300	8,140	4,440
10	4,580	17,800	31,600	11,200	10,800	7,640	25	7,800	9,700	39,200	7,140	7,800	4,440
11	5,430	16,200	33,800	11,500	10,800	7,970	26	8,660	10,800	39,600	6,660	7,470	4,440
12	6,190	14,200	36,000	11,900	10,100	8,140	27	9,350	11,500	39,600	6,190	7,140	4,440
13	6,980	12,300	38,700	11,200	10,100	7,970	28	9,350	12,300	32,100	8,660	6,980	4,180
14	7,800	11,500	41,900	11,200	9,350	7,640	29	8,480	12,300	27,300	10,100	6,820	3,930
15	8,480	12,300	44,600	12,300	9,700	7,640	30	8,310	11,900	23,600	10,400	6,660	3,810
							31		12,300		10,400	6,500	

NOTE.—No record obtained Oct. 1 to Mar. 31.

Monthly discharge of Snake River near Shelley, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April	9,350	4,180	6,510	387,000
May	17,800	8,660	12,500	769,000
June	46,900	14,200	32,800	1,950,000
July	19,000	6,190	11,400	701,000
August	11,200	6,500	8,920	548,000
September	8,140	3,810	6,220	370,000
The period				4,720,000

SNAKE RIVER AT PORTERVILLE BRIDGE, NEAR BLACKFOOT, IDAHO.

LOCATION.—In sec. 26, T. 2 S., R. 35 E., 3½ miles north of Blackfoot, Bingham County, one-fourth mile below Porterville Bridge, and immediately below heading of Danskin canal. Station was formerly maintained at Porterville Bridge, above heading of Danskin canal.

DRAINAGE AREA.—Not measured.

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RECORDS AVAILABLE.—May 13 to September 30, 1918, at present site: June 12 to September 30, 1916, at site at Porterville highway bridge.

GAGE.—Inclined staff gage on left bank opposite tenant house of Mrs. Anenine Hanson; read by Henry Ronfeld. Gage used prior to September 30, 1916, vertical staff on right abutment of Porterville Bridge.

DISCHARGE MEASUREMENTS.—Made from cables over two channels about a quarter of a mile below gage. Cables washed out by high water in June, 1918, but were replaced July 18.

CHANNEL AND CONTROL.—Bed composed of cobble in gravel drift; clean except for occasional lodgment of drift. Control shifts at high stages. One channel at gage but divided by an island into two channels at control, except at extreme low stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.5 feet at 7 p. m. June 17 and 6 a. m. June 18 (discharge, 46,900 second-feet); minimum stage, 5.5 feet at 6 a. m. and 7 p. m. September 30 (discharge, 2,800 second-feet).

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Practically the entire natural summer flow of the river is diverted above the station.

REGULATION.—Natural flow during the irrigation season is augmented by the release of stored flood waters in Jackson Lake for use on the Minidoka and Twin Falls tracts.

ACCURACY.—Stage-discharge relation not permanent. Two parallel rating curves used, fairly well defined between 4,000 and 10,000 second-feet; one applicable May 13–30, the other June 13 to September 30. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Discharge measurements of Snake River at Porterville Bridge, near Blackfoot, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 30	T. R. Newell	7.60	10,400	Aug. 3	G. C. Baldwin	6.21	4,900
July 19	R. B. Kilgore	7.45	9,180	Sept. 19	do	6.01	4,260

Daily discharge, in second-feet, of Snake River at Porterville Bridge, near Blackfoot, Idaho, for the year ending Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1			16,800	6,880	4,560	16	10,700	44,000	11,600	8,340	6,190
2			14,500	5,190	4,560	17	11,300	46,200	11,300	8,720	6,190
3			13,600	4,870	4,560	18	9,700	46,200	10,300	9,110	6,190
4			13,300	5,030	4,560	19	9,600	44,000	9,300	9,110	4,250
5			13,300	5,520	4,720	20	9,500	41,800	8,340	8,160	3,500
6			12,400	6,700	5,190	21	8,160	39,500	7,420	7,240	3,220
7			11,300	7,970	5,360	22	7,060	38,100	6,530	6,700	3,080
8			10,500	8,920	5,520	23	7,420	38,100	5,520	6,530	3,080
9			10,300	8,920	5,520	24	7,780	38,100	4,870	6,360	3,080
10			9,110	8,720	5,850	25	8,160	37,400	4,560	6,190	3,080
11			9,110	8,720	6,190	26	8,920	38,100	4,100	5,680	3,080
12			9,700	8,340	6,190	27	9,510	35,900	3,800	5,190	3,080
13	11,100	35,200	9,300	7,780	6,530	28	10,100	30,900	5,030	5,190	2,940
14	9,500	38,800	9,300	7,240	6,190	29	10,700	25,400	7,240	5,030	2,940
15	9,700	42,500	10,100	7,420	6,190	30	10,300	21,500	7,600	4,870	2,800
						31	11,000		7,600	4,720	

NOTE.—No record Oct. 1 to May 12. Discharge June 1–12, estimated 20,000 second-feet.

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Monthly discharge of Snake River at Porterville Bridge, near Blackfoot, Idaho, for th year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 13-31	11,300	7,060	9,480	357,00
June	46,200	.....	30,700	1,830,00
July	16,800	3,800	9,280	571,00
August	9,110	4,720	6,950	427,00
September	6,530	2,800	4,610	274,00
The period	.....	.....	.....	3,460,00

SNAKE RIVER NEAR BLACKFOOT, IDAHO.

LOCATION.—In sec. 31, T. 3 S., R. 34 E., a quarter of a mile below mouth of Blackfoot River and 14 miles southwest of Blackfoot, Bingham County. Blackfoot River is only large tributary between station and mouth of Henrys Fork, about 60 miles above. Portneuf and Bannock rivers and 2,500 second-feet of spring water enter between this station and station at Neeley.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 6, 1910, to September 30, 1918.

GAGE.—Friez water-stage recorder on right bank: installed July 6, 1913, at same site and datum as staff gage installed October 1, 1912. Original gage, used June 6, 1910, to September 30, 1912, was 50 feet above present site. Datum of gage raised 0.06 foot June 25, 1911, and 0.03 foot October 1, 1912, when new staff gage was installed. Observer, J. A. Clough.

DISCHARGE MEASUREMENTS.—Made by wading or from a cable about 50 feet above the gage.

CHANNEL AND CONTROL.—Bed composed of very coarse gravel. Two channels at low and medium stages. Control shifts slightly during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 14.80 feet (approximately), at 5 p. m. June 18 (discharge, about 46,200 second-feet); exact discharge uncertain because of probable shift in stage-discharge relation at about this period. Minimum stage, 3.45 feet at 3.40 p. m. February 3 (discharge, 1,790 second-feet).

1910–1918: Maximum stage recorded as stated above; minimum stage, 1.89 feet August 11 and 15, 1910 (discharge, 238 second-feet).

ICE.—Floating ice sometimes present for short periods; stage-discharge relation apparently not affected.

DIVERSIONS.—Practically all the natural summer flow of the river is diverted above station.

REGULATION.—Flow regulated by storage in Jackson Lake reservoir and also by storage in Blackfoot-Marsh reservoir on Blackfoot River. Practically all the summer flow is water released from these reservoirs.

ACCURACY.—Stage-discharge relation not permanent. Two rating curves used; well defined for low and medium stages; one, with several parallel curves, applicable October 1 to June 26, the other July 7 to September 30. Operation of water-stage recorder satisfactory except for periods October 16–31 and February 1–3 when staff gage readings were made. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Shifting-control method used June 27 to July 6. Records good.

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Discharge measurements of Snake River near Blackfoot, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 2	C. F. Elford	4.20	2,990	Aug. 1	G. C. Baldwin	6.32	6,730
11	do	4.77	3,780	4	do	5.61	4,860
July 10	G. C. Baldwin	7.42	9,240	16	do	7.00	8,290
18	do	7.87	11,100	Sept. 20	do	5.10	3,800

Daily discharge, in second-feet, of Snake River near Blackfoot, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,610	4,510	4,200	4,830	2,180	3,100	4,940	8,090	12,000	18,500	6,880	4,430
2	4,610	4,510	4,400	4,610	2,160	3,010	5,390	9,050	13,600	15,600	5,080	4,540
3	4,510	4,510	4,510	4,400	1,790	3,010	5,510	10,100	13,600	14,200	4,860	4,540
4	4,510	4,510	4,300	4,300	1,980	3,360	5,390	11,200	13,200	13,600	4,970	4,640
5	4,400	4,510	4,100	4,200	2,770	3,270	4,940	13,200	13,600	13,500	5,310	4,640
6	4,400	4,510	3,900	4,200	3,180	3,360	4,610	15,800	15,400	12,500	6,620	5,200
7	4,400	4,510	4,100	4,200	3,440	3,440	4,510	16,300	18,600	11,200	7,520	5,420
8	4,300	4,510	3,810	4,100	3,360	3,440	4,200	16,300	22,400	11,200	8,320	5,540
9	4,300	4,510	3,720	4,000	3,270	3,270	4,100	16,300	26,300	10,300	8,590	5,770
10	4,300	4,510	4,200	3,270	3,180	3,530	4,300	16,700	28,800	9,440	8,590	6,010
11	4,100	4,400	3,520	2,770	3,100	3,900	4,940	15,800	30,300	9,150	8,590	6,250
12	4,000	4,400	3,360	2,460	3,100	4,100	5,750	13,600	32,300	9,730	8,320	6,620
13	3,900	4,400	4,510	2,250	3,100	4,300	6,390	11,600	34,900	9,440	7,780	6,750
14	3,840	4,300	4,610	2,390	3,010	4,200	7,210	10,100	37,400	9,440	7,780	6,500
15	3,780	4,400	4,610	2,770	3,100	4,000	8,090	10,100	41,000	10,000	7,780	6,500
16	3,720	4,300	4,300	3,010	3,010	3,620	8,400	10,800	43,600	11,200	8,320	6,620
17	3,900	4,300	4,300	3,270	3,010	3,620	8,090	11,200	45,700	11,200	8,870	6,620
18	4,080	4,400	4,100	3,620	3,100	3,720	7,350	10,800	46,200	10,600	9,150	6,380
19	4,120	4,300	4,200	3,530	2,770	3,810	6,260	10,100	45,200	9,730	9,150	4,860
20	4,160	4,200	4,200	3,620	3,010	3,900	5,510	9,390	42,600	8,590	8,590	3,910
21	4,280	4,100	4,300	3,530	3,100	3,900	5,160	8,090	40,500	7,780	7,520	3,320
22	4,320	4,200	4,200	3,440	2,850	3,900	5,390	7,210	39,000	7,000	7,000	2,960
23	4,340	4,200	4,200	3,360	3,180	3,810	5,880	6,790	39,000	5,660	6,880	2,960
24	4,300	4,200	4,100	3,440	3,440	3,900	6,650	6,920	38,400	5,080	6,750	2,870
25	4,300	4,300	4,200	3,810	3,530	3,900	7,350	7,350	37,900	4,640	6,500	2,960
26	4,380	4,200	4,300	3,720	3,360	4,000	7,940	8,400	38,400	4,320	6,130	3,050
27	4,400	4,300	4,200	3,530	3,440	4,300	8,720	9,740	37,500	3,710	5,540	3,050
28	4,510	4,300	4,200	3,620	3,100	4,400	9,050	10,800	32,200	4,220	5,200	2,960
29	4,550	4,200	4,400	3,270	.....	4,400	8,720	11,200	27,000	6,750	4,970	2,870
30	4,510	4,200	4,610	3,010	.....	4,510	8,090	10,800	22,900	7,260	4,860	2,700
31	4,530	.....	4,830	2,620	.....	4,610	.....	10,800	.....	7,260	4,750	.....

Monthly discharge of Snake River near Blackfoot, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4,610	3,720	4,270	263,000
November	4,510	4,100	4,360	259,000
December	4,830	3,360	4,210	259,000
January	4,830	2,250	3,520	216,000
February	3,530	1,790	2,990	166,000
March	4,610	3,010	3,790	233,000
April	9,050	4,100	6,290	374,000
May	16,700	6,790	11,100	682,000
June	46,200	12,000	31,000	1,840,000
July	18,500	3,710	9,450	581,000
August	9,150	4,750	7,010	431,000
September	6,750	2,700	4,710	280,000
The year	46,200	1,790	7,720	5,580,000

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SNAKE RIVER AT NEELEY, IDAHO.

LOCATION.—In sec. 11, T. 8 S., R. 30 E., half a mile north of Neeley post office, Power County, 4 miles southwest of American Falls, and 32 miles above the Minidoka dam. Portneuf and Bannock rivers and 2,500 second-feet of spring water enter Snake River between station near Blackfoot and that at Neeley. Raft River enters about 18 miles below Neeley.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 17, 1906, to September 30, 1918.

GAGE.—Friez water-stage recorder installed August 8, 1910, on left bank at site of staff gage originally used. Observers, Morgan and Wallis.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Bed of river at measuring section rough, especially near right bank. Banks high and clean. One channel at all stages. Control is of lava rock, probably partly overlain with coarse gravel; shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, somewhat doubtful. Maximum mean for day, 13.5 feet June 20 (discharge, 48,400 second-feet); minimum stage, 4.67 feet at 8 a. m. February 5 (discharge, 4,280 second-feet).

1906–1918: Maximum stage doubtful; maximum daily mean, 13.5 feet June 20, 1918 (discharge, 48,400 second-feet); minimum stage, 3.65 feet August 20–22 1906 (discharge, 2,220 second-feet).

ICE.—Stage-discharge relation seriously affected by ice at times.

DIVERSIONS.—Numerous canals near Blackfoot and Idaho Falls divert practically the entire natural summer flow of Snake River.

REGULATION.—Summer flow augmented by stored water from Jackson Lake for use on the Minidoka project and Twin Falls tracts. Diurnal fluctuations sometimes result from operation of power plant 4 miles upstream.

ACCURACY.—Stage-discharge relation not permanent. Standard curve well defined. Parallel curve used for period June 24 to September 30. Operation of water-stage recorder satisfactory except for short periods mentioned in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph; shifting-control method used June 22–23. Records good except those for short periods during January and February, which are fair.

Discharge measurements of Snake River at Neeley, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	William Kessler	5.62	6,870	July 31	G. C. Baldwin	6.39	9,420
Feb. 26	C. E. Tappan	5.44	6,590	Aug. 27	do	6.06	8,480
May 18	G. C. Baldwin	7.40	13,800	Sept. 25	do	5.19	5,810
July 19	do	7.32	13,500				

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Daily discharge, in second-feet, of Snake River at Neeley, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7,850	7,340	7,180	7,680	5,050	5,650	7,600	11,000	14,000	27,300	9,730	6,910
2	7,680	7,340	7,340	7,680	4,700	5,650	7,950	11,400	15,800	21,200	8,980	6,750
3	7,510	7,340	7,340	7,510	4,620	5,550	8,500	11,800	16,300	18,600	7,580	6,910
4	7,340	7,340	7,510	7,340	4,490	6,220	8,600	13,100	15,800	17,600	7,580	6,910
5	7,340	7,340	7,340	7,180	4,360	6,370	8,500	14,400	15,800	17,100	7,580	7,080
6	7,340	7,340	7,010	7,010	5,170	6,220	8,000	16,000	16,800	16,100	7,920	7,240
7	7,340	7,340	6,850	7,100	5,610	6,370	7,680	18,500	18,800	15,200	8,980	7,750
8	7,340	7,340	6,850	7,000	5,760	6,530	7,510	18,800	22,500	14,300	10,500	7,750
9	7,340	7,340	6,690	6,100	5,170	6,530	7,180	18,800	25,200	14,300	11,300	8,090
10	7,180	7,340	6,690	6,600	5,320	6,370	7,180	18,800	28,600	13,400	11,300	8,260
11	7,010	7,340	7,010	6,000	5,760	6,650	7,180	19,300	30,400	12,100	11,300	8,620
12	7,010	7,340	6,370	5,300	5,760	7,000	7,850	17,800	32,200	12,500	11,300	8,800
13	6,850	7,340	6,370	5,000	5,910	7,200	8,730	15,800	33,300	13,000	10,900	9,160
14	6,690	7,180	7,180	4,800	5,760	7,400	9,460	13,500	35,100	12,500	10,500	9,160
15	6,690	7,180	7,340	5,000	5,760	7,300	10,200	12,700	36,900	12,500	10,500	8,980
16	6,530	7,340	7,510	5,300	5,760	7,100	11,400	12,700	39,300	13,400	10,900	9,160
17	6,530	7,180	7,340	5,800	5,460	6,750	11,400	13,500	41,700	14,700	11,300	9,160
18	6,690	7,180	7,180	6,200	5,170	6,750	11,000	14,000	44,800	14,300	11,700	9,160
19	6,850	7,180	7,010	6,530	5,030	6,850	10,000	13,100	48,000	13,400	12,100	8,620
20	6,850	7,180	7,010	6,530	5,000	6,950	8,910	12,700	48,400	12,100	11,700	7,080
21	7,010	7,010	7,010	6,370	5,300	6,900	8,550	11,800	47,800	11,300	10,900	6,120
22	7,010	7,010	7,010	6,370	5,400	6,900	8,200	11,000	45,900	10,100	10,100	5,820
23	7,010	7,010	7,010	6,060	5,030	6,900	8,550	10,000	44,000	9,160	9,730	5,820
24	7,180	7,010	7,010	5,910	5,460	6,850	8,910	9,650	42,700	7,920	9,540	5,670
25	7,180	7,010	7,010	6,060	6,000	6,850	9,840	9,650	42,100	7,410	9,350	5,520
26	7,180	7,070	7,010	6,370	6,530	6,850	10,200	10,200	41,500	7,080	9,160	5,520
27	7,180	7,120	7,180	6,220	6,100	7,010	11,400	11,800	41,500	6,430	8,620	5,670
28	7,180	7,180	7,180	6,060	6,250	7,340	12,200	13,100	38,500	5,970	8,090	5,670
29	7,340	7,180	7,180	6,200	.....	7,340	12,200	14,000	35,600	7,410	7,750	5,670
30	7,340	7,180	7,340	5,850	.....	7,510	11,400	14,000	32,600	9,730	7,410	5,520
31	7,340	.....	7,510	5,450	.....	7,510	.....	14,000	.....	9,730	7,240	.....

NOTE.—Stage-discharge relation affected by ice at times during January and February, and discharge estimated by comparison with record at Blackfoot station above and by study of temperature graph, Jan. 7-18, Jan. 29 to Feb. 2, Feb. 20-22, Feb. 27 to Mar. 3, Mar. 11-23, Apr. 1-6, May 6-7, and June 19. Discharge interpolated because of lack of gage-height record, Nov. 26-27, Feb. 25 and June 28-29.

Monthly discharge of Snake River at Neeley, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	7,850	6,530	7,130	438,000
November	7,340	7,010	7,220	430,000
December	7,510	6,370	7,080	435,000
January	7,680	4,800	6,300	387,000
February	6,530	4,360	5,420	301,000
March	7,510	5,550	6,750	415,000
April	12,200	7,180	9,210	548,000
May	19,300	9,650	13,800	848,000
June	48,400	14,000	33,100	1,970,000
July	27,300	5,970	12,800	787,000
August	12,100	7,240	9,730	598,000
September	9,160	5,520	7,280	433,000
The year	48,400	4,360	10,500	7,590,000

LAKE WALCOTT NEAR MINIDOKA, IDAHO.

LOCATION.—In sec. 1, T. 9 S., R. 25 E., in backwater of Reclamation Service dam 6 miles southeast of Minidoka post office, Minidoka County.

RECORDS AVAILABLE.—April 1, 1909, to September 30, 1918.

GAGE.—Hook gage in wooden stilling well on face of dam at entrance to power house. Early gage-height record from hook gage in concrete stilling well on point of rocks in front of power house. Same datum as present gage. Zero of gage, 4,200 feet above sea-level.

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ACCURACY.—Gage heights occasionally affected by wind.

COOPERATION.—Gage-height record furnished by United States Reclamation Service.

Lake Walcott impounds water for the irrigation of lands in the North Side Minidoka project and the South Side Minidoka project of the United States Reclamation Service. It has a capacity of 107,240 acre-feet between elevations 4,236 and 4,246 feet; elevation of spillway, 4,240 feet, sea level datum.

Daily contents, in acre-feet, of Lake Walcott near Minidoka, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	76,550	64,470	85,870	85,640	83,200	84,120	85,980	92,860	102,050	101,450	94,370	101,210
2	79,140	64,580	85,870	86,450	82,300	83,310	87,380	92,040	102,050	100,010	95,910	99,880
3	82,070	65,340	85,870	85,980	81,740	83,540	85,870	92,160	100,970	103,020	94,840	98,560
4	85,980	66,550	85,640	84,820	82,070	83,540	86,450	92,860	100,850	102,410	91,570	96,510
5	89,130	66,990	85,520	85,750	81,740	83,200	86,800	93,090	98,800	102,410	90,060	95,910
6	91,570	67,210	84,700	85,870	82,190	84,120	86,220	96,030	98,680	102,900	88,660	95,180
7	94,250	69,190	85,050	85,400	83,090	84,120	83,540	98,320	99,640	104,340	90,290	95,180
8	96,990	71,280	84,700	85,980	83,540	84,120	83,540	96,870	101,930	103,380	92,860	95,790
9	97,350	76,770	84,820	85,980	84,120	84,120	83,540	97,230	101,690	104,220	96,630	97,230
10	95,790	80,950	85,170	85,870	82,980	84,470	83,540	97,110	103,380	103,980	102,410	100,490
11	94,370	82,190	85,290	84,700	83,310	84,350	83,540	97,110	101,930	103,140	104,820	101,930
12	92,510	82,520	83,090	83,540	83,540	85,170	83,540	97,470	102,900	103,020	105,190	103,020
13	91,340	82,520	84,120	82,860	82,980	84,350	83,540	95,910	101,690	104,700	105,310	104,220
14	88,310	84,700	85,640	82,980	83,540	86,100	86,680	93,440	102,410	104,700	104,100	105,070
15	84,940	85,640	85,750	82,860	83,090	85,870	87,500	92,510	103,020	104,220	105,310	105,070
16	80,830	85,870	85,870	83,310	83,090	85,520	89,130	92,860	103,740	104,580	105,550	103,260
17	77,110	85,980	85,870	83,540	83,310	84,940	87,850	93,670	103,620	105,430	104,820	104,820
18	74,630	85,290	85,750	81,850	83,200	85,170	88,780	94,020	103,860	104,460	105,310	105,430
19	71,720	85,520	85,520	84,470	83,090	84,700	88,550	93,550	103,860	104,820	105,310	105,910
20	69,520	85,640	85,400	84,470	83,310	85,050	84,700	94,020	103,860	104,220	102,900	105,790
21	67,980	85,520	85,640	84,700	82,860	85,290	82,860	93,550	104,100	104,700	104,820	105,790
22	66,550	85,400	85,640	84,240	83,200	85,520	82,410	92,040	102,900	104,460	101,690	105,910
23	65,450	85,290	85,640	84,120	82,980	85,640	81,060	90,880	104,220	103,500	104,460	105,910
24	64,360	84,910	85,640	84,120	83,540	85,870	79,030	88,780	102,780	102,900	103,620	105,910
25	64,250	85,520	85,870	84,010	84,010	85,870	77,450	89,250	103,620	100,270	104,820	105,670
26	63,040	85,640	85,290	84,470	84,120	85,980	76,100	89,940	104,700	97,230	103,620	105,430
27	63,920	85,870	85,400	84,700	84,120	85,640	77,110	90,990	104,340	94,950	102,050	105,670
28	64,140	85,290	85,290	84,700	83,770	85,980	80,160	94,020	104,100	92,740	103,380	103,380
29	64,140	85,520	85,980	82,860	.....	85,870	80,490	101,690	104,820	89,130	103,260	96,630
30	63,920	86,330	85,980	84,700	.....	85,980	80,610	101,930	100,010	89,940	102,660	91,230
31	64,250	.....	86,100	84,120	.....	85,290	.....	98,320	.....	92,510	102,170	.....

SNAKE RIVER NEAR MINIDOKA, IDAHO.

LOCATION.—In sec. 2, T. 9 S., R. 25 E., 100 yards below Howells ferry, 1 mile below Reclamation Service dam, 6 miles southeast of Minidoka post office, Minidoka County, nearest railroad point, and 6 miles above Montgomery's ferry station, which was discontinued December 31, 1910. Raft River enters between this station and the station at Neeley.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 21, 1910, to September 30, 1918.

GAGE.—Friez water-stage recorder on right bank directly across river from and at same datum as staff gage used prior to August 28, 1911; also Stevens long-distance recorder installed in 1915. Gage inspected by employees of United States Reclamation Service.

DISCHARGE MEASUREMENTS.—Made from cable about 50 feet below gage.

CHANNEL AND CONTROL.—Bed composed of coarse gravel. One channel at all stages. Control shifts slightly but infrequently.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 16.02 feet at 1 a. m. June 21 (discharge, 45,900 second-feet); minimum stage recorded, 5.85 feet at 6 p. m. September 26 (discharge, 3,950 second-feet).

1910–1918: Maximum stage recorded, that of June 21, 1918; minimum stage, 4.05 feet from 11 a. m. to 3 p. m. October 13, 1914 (discharge, 960 second-feet).

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ICE.—Some shore ice forms in vicinity of gage and river closes farther down; stage-discharge relation slightly affected at times.

DIVERSIONS.—The North Side and South Side Minidoka canals divert water between the Neeley and Minidoka stations. The nearest diversions below the station are the Twin Falls North Side and South Side canals at Milner.

REGULATION.—Flow partly regulated by storage in Lake Walcott above Minidoka dam (storage capacity about 67,000 acre-feet above spillway).

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined. Parallel curve used during period July 3 to September 30. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph except as noted in footnote to daily-discharge table. Records good.

COOPERATION.—Gage-height record furnished by United States Reclamation Service.

Discharge measurements of Snake River near Minidoka, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 14	C. F. Elford	7.29	7,720	July 20	G. C. Baldwin	7.63	8,330
July 20	G. C. Baldwin	8.10	9,390	30	do	6.61	5,630

Daily discharge, in second-feet, of Snake River near Minidoka, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5,220	7,220	7,220	7,480		6,080	7,480	8,580	10,800	25,300	6,280	5,290
2	5,100	6,960	7,480	7,750	5,900	5,830	8,020	8,580	11,900	19,000	6,400	5,290
3	4,870	6,960	7,480	7,480		5,830	7,480	8,870	13,900	15,800	6,530	5,780
4	4,870	6,960	7,480	7,220	5,460	5,830	7,750	9,480	13,900	14,800	6,150	5,410
5	4,870	6,960	7,480	7,480	5,100	6,200	7,480	10,500	13,100	14,000	5,780	5,060
6	4,980	6,450	7,220	7,480	5,460	6,200	7,480	12,300	13,100	13,000	5,780	5,170
7	4,870	6,080	7,220	7,220	5,950	6,200	6,960	14,700	13,900	12,800	5,900	5,290
8	5,460	4,980	7,220	7,480	6,320	6,200	6,700	15,500	17,200	11,500	6,150	5,290
9	6,830	4,610	6,960	7,750	6,200	6,580	6,450	15,900	20,800	11,100	6,150	5,410
10	7,480	6,080	6,960	7,480	5,700	6,200	6,580	15,900	21,900	10,800	6,280	5,410
11	7,480	6,700	7,220	6,830	5,950	6,200	6,450	15,900	26,800	9,580	8,670	5,530
12	7,480	6,960	6,830	5,830	6,200	6,700	6,700	15,500	28,200	8,670	9,110	7,040
13	7,480	6,700	6,830	5,700	6,320	6,700	7,220	13,900	30,100	9,260	8,960	6,650
14	8,020	6,830	7,480	5,580	6,320	7,750	8,020	11,600	31,000	10,800	7,430	7,170
15	8,300	7,220	7,750	5,580	6,080	7,480	8,870	10,100	33,400	9,420	7,830	8,380
16	8,300	7,220	7,750	5,950	5,950	6,960	9,480	10,100	35,700	10,200	8,810	7,430
17	8,300	7,480	7,480	6,080	5,950	6,700	10,100	10,800	38,600	12,000	8,960	7,560
18	7,750	7,220	7,480	6,080	5,950	6,700	9,800	10,800	41,000	11,700	8,960	7,010
19	8,300	7,220	7,220	6,700	6,080	6,830	10,100	10,800	43,900	10,800	10,600	7,700
20	8,020	7,220	7,220	6,700	5,830	6,700	8,870	10,100	45,300	9,260	10,800	5,900
21	8,020	7,220	7,220	6,830	5,700	6,830	7,480	9,800	45,800	8,520	7,830	4,820
22	7,750	6,960	7,220	6,700	5,830	6,830	7,480	8,870	31,900	8,100	8,100	5,290
23	7,480	7,220	7,220	6,570	5,700	6,830	8,020	7,750	42,900	6,650	7,430	4,160
24	7,750	6,960	7,220	6,450	5,830	6,830	8,020	7,220	41,000	6,530	7,300	4,820
25	7,750	7,220	7,220	6,320	6,700	6,830	8,300	7,220	39,600	6,400	6,910	4,940
26	7,480	7,220	7,220	6,830	6,320	6,960	8,870	7,480	40,000	6,020	7,970	4,270
27	7,750	7,480	7,220	6,960	6,450	6,830	8,300	7,480	40,000	5,780	6,400	5,290
28	7,220	7,220	7,220	6,960	6,320	7,480	6,830	6,580	40,000	5,660	6,020	7,300
29	7,220	7,220	7,220	6,830	.....	7,220	6,830	8,870	39,600	5,660	5,780	7,700
30	7,220	7,480	7,220	6,700	.....	6,960	7,750	12,300	32,700	5,660	5,660	6,150
31	7,220	.....	7,480	6,400	.....	6,960	.....	10,100	.....	6,020	5,530	.....

NOTE.—Stage-discharge relation affected by ice Jan. 31 to Feb. 3. Discharge estimated Feb. 1–3, 5,900 second-feet.

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Monthly discharge of Snake River near Minidoka, Idaho, for the year ending Sept. 30, 1918

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8,300	4,870	6,990	430,000
November	7,480	4,610	6,880	409,000
December	7,750	6,830	7,280	448,000
January	7,750	5,580	6,760	416,000
February	6,700	5,100	5,980	332,000
March	7,750	5,830	6,660	410,000
April	10,100	6,450	7,860	468,000
May	15,900	6,580	10,800	664,000
June	45,800	10,800	30,400	1,810,000
July	25,300	5,660	10,300	633,000
August	10,800	5,530	7,310	449,000
September	8,380	4,160	5,950	354,000
The year	45,800	4,160	9,430	6,820,000

LAKE MILNER AT MILNER, IDAHO.

LOCATION.—In sec. 29, T. 10 S., R. 21 E., in backwater of Twin Falls companies' dam at Milner, Cassia County.

RECORDS AVAILABLE.—April 10, 1911, to September 30, 1918.

GAGE.—Staff gage at dam. A Lietz and a Friez water-stage recorder have also been used for short periods. All gages have same datum.

ACCURACY.—Gage heights occasionally seriously affected by wind.

COOPERATION.—Gage-height record furnished by Twin Falls North Side Land & Water Co. and Twin Falls Canal Co.

Daily gage height, in feet, of Lake Milner at Milner, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.70	9.00	8.30	8.30	8.80	8.70	8.65	10.00	10.53	10.66	10.76	10.94
2	9.28	8.90	8.30	8.20	7.50	8.50	9.02	10.25	10.51	10.67	10.87	10.89
3	9.58	8.90	8.50	8.30	7.90	8.50	9.04	10.06	10.48	10.68	11.01	10.98
4	9.28	8.70	8.40	8.20	8.00	8.20	9.08	10.20	10.54	10.71	11.00	10.90
5	9.16	7.80	8.35	8.20	7.94	8.60	9.16	10.26	10.50	10.72	10.75	10.88
6	9.24	7.50	8.40	9.00	7.94	8.65	9.17	10.35	10.52	10.71	10.72	10.88
7	9.50	7.00	8.20	7.90	8.20	8.56	8.79	10.35	10.54	10.71	10.72	10.90
8	10.26	7.50	8.40	9.80	8.50	8.60	8.75	10.30	10.52	10.72	10.76	10.88
9	8.20	6.90	8.50	10.00	8.72	8.70	8.86	10.38	10.49	10.71	10.82	10.91
10	8.00	7.00	8.30	9.60	8.40	8.75	8.89	10.37	10.52	10.72	10.89	10.92
11	8.00	8.40	8.20	9.50	8.20	8.70	9.08	10.37	10.52	10.72	10.88	10.88
12	8.00	9.20	7.60	9.40	8.40	8.80	9.02	10.34	10.52	10.72	10.92	10.92
13	8.00	9.20	8.20	8.40	8.20	8.40	8.91	10.31	10.51	10.74	10.94	10.91
14	8.00	8.00	8.00	8.40	8.50	8.90	9.05	10.36	10.54	10.74	10.92	10.92
15	8.45	8.20	8.20	8.30	8.50	8.95	9.42	10.38	10.54	10.73	10.88	10.91
16	8.60	8.20	8.20	8.30	8.50	8.55	9.28	10.40	10.55	10.78	10.95	10.92
17	8.70	8.40	8.30	8.50	8.35	8.40	9.27	10.38	10.62	10.78	10.90	10.64
18	9.00	8.60	8.30	8.40	8.30	8.20	9.35	10.40	10.64	10.76	10.88	10.02
19	9.00	7.80	8.30	8.40	8.40	8.50	9.21	10.44	10.65	10.75	10.89	10.40
20	9.20	8.10	8.00	8.40	8.50	8.58	9.24	10.40	10.63	10.74	10.92	10.78
21	8.90	8.20	8.00	8.40	8.40	8.48	8.82	10.43	10.62	10.74	10.92	10.80
22	9.00	8.30	8.00	8.20	8.40	8.50	8.91	10.40	10.60	10.76	10.91	10.86
23	9.00	8.10	8.40	8.50	8.40	8.74	9.18	10.40	10.62	10.78	10.91	10.37
24	9.60	8.30	8.10	8.50	8.40	8.64	9.38	10.32	10.63	10.68	10.91	10.48
25	9.40	8.10	8.10	8.50	8.20	8.54	9.50	10.38	10.65	10.96	10.92	10.56
26	8.00	8.35	8.10	8.30	8.70	8.54	9.79	10.40	10.67	10.95	10.90	10.58
27	8.40	8.30	8.30	8.30	8.60	8.70	9.94	10.37	10.67	10.81	10.88	10.42
28	8.60	8.30	8.10	9.20	8.70	8.90	9.62	10.34	10.66	10.80	10.89	10.26
29	8.20	8.30	8.10	8.60	.....	.....	9.68	10.42	10.66	10.34	10.90	9.93
30	8.70	8.30	8.00	8.50	.....	8.60	9.74	10.37	10.65	10.72	10.93	9.82
31	9.00	.....	8.00	8.20	.....	.....	.....	10.27	.....	10.61	10.91	.....

NOTE.—Data on contents corresponding to gage heights are not available.

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SNAKE RIVER AT MILNER, IDAHO.

LOCATION.—In sec. 29, T. 10 S., R. 21 E., 300 yards below Milner dam, at Milner, Twin Falls County. No tributaries enter Snake River between Minidoka station and Milner, and no noteworthy amount of water between Milner and station near Twin Falls except seepage and spring water.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 10, 1909, to September 30, 1918.

GAGE.—Staff gage in three sections on left bank: installed October 20, 1909; high and low sections vertical, middle section inclined. An auxiliary gage in two sections is located about 100 yards below the main gage, to which it bears no definite relation; low-water section, an inclined staff on right bank; high-water section, an inclined staff on left bank. Datum of auxiliary gage lowered 1.00 foot July 30 and 1.00 foot September 7, 1916. Gage used prior to October 20, 1909, was a vertical staff on right bank, at about the same datum as present gage. Observers, Deming and McConnel.

DISCHARGE MEASUREMENTS.—Made from a cable at gage, from foot planks at the auxiliary low-water gage, or by wading. Measurements may also be made from the suspension highway bridge a quarter of a mile below the main gage but conditions for making measurements at this bridge are poor.

CHANNEL AND CONTROL.—Bed of stream at both the main gage and the auxiliary gage consists of lava rock, which forms the control for the low-water gage. Control for main gage is an old crib-and-rock diversion dam and is practically permanent for medium and high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 19.90 feet at 6.50 p. m. June 21 (discharge, 40,000 second-feet); minimum stage recorded, 1.56 feet July 26, 27, and 28 (discharge, 26.8 second-feet).

1909–1918: Maximum stage recorded, 20.1 feet June 12, 1909 (discharge, 44,400 second-feet); minimum stage, −1.08 feet (old datum of auxiliary gage) August 17–18, 1915 (discharge, 9 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice; observations discontinued during part of winter because gages are inaccessible to observer.

DIVERSIONS.—The Twin Falls canals divert water at Milner dam, just above station. During part of the season practically the entire flow of the river is taken by these canals.

REGULATION.—Flow past station during the irrigation season is regulated at Milner dam.

ACCURACY.—Stage-discharge relation practically permanent during the year. Rating curve well defined below 24,000 second-feet. Gage read occasionally to half-tenths October 1–8 and January 15 to March 28; twice a day to hundredths April 6 to September 30. Daily discharge ascertained by applying mean daily gage height to rating table, except on days when marked changes occurred, when the mean of the discharge corresponding to the gage readings was used. Records poor October to March; fair April to June; good July to September.

COOPERATION.—Gage-height record and some discharge measurements furnished by Twin Falls North Side Land & Water Co. and the Twin Falls Canal Co.

Discharge measurements of Snake River at Milner, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 5	Burdick and McConnel.	13.70	7,010	July 29	Baldwin and McConnel.	1.57	28.2
July 25	Adams and McConnel..	1.90	42.3	Aug. 3	W. N. McConnel.....	1.93	39.4
27	W. N. McConnel.....	1.56	26.2	Sept. 6	.....do.....	1.68	34.4

NOTE.—Burdick and Adams, employees of the North Side Land & Water Co.; McConnel, employee of the Twin Falls Canal Co.

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Daily discharge, in second-feet, of Snake River at Milner, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,280	.....	.....	5,560	5,630	2,790	7,130	20,300	30	36
2	2,490	.....	.....	5,440	5,890	2,790	5,390	15,000	36	32
3	2,490	.....	.....	5,310	6,150	3,130	8,220	9,940	46	32
4	2,350	.....	.....	5,180	6,410	3,130	7,610	9,240	298	30
5	2,280	.....	4,590	5,060	6,670	3,980	6,780	8,070	34	32
6	2,280	.....	4,590	5,830	6,970	5,690	7,010	6,970	30	34
7	2,490	.....	5,300	5,830	5,970	8,470	7,490	5,800	32	34
8	2,490	.....	5,830	5,830	4,380	8,720	16,800	5,100	32	32
9	.....	.....	5,970	5,830	3,970	10,800	15,600	4,060	34	292
10	.....	.....	5,970	5,970	3,790	10,300	16,200	4,550	32	284
11	.....	.....	5,060	5,830	3,970	9,750	21,000	3,630	2,660	292
12	.....	.....	4,820	5,970	3,790	9,230	21,800	2,810	2,320	2,910
13	.....	.....	5,060	5,060	3,520	8,470	23,100	3,500	3,080	1,520
14	.....	.....	5,300	6,500	4,170	6,550	24,200	6,330	1,540	772
15	.....	4,380	5,300	6,400	4,590	4,730	25,400	4,550	1,040	1,740
16	.....	4,380	5,180	5,900	6,970	4,060	29,300	5,290	2,730	4,730
17	.....	4,480	4,820	5,830	7,280	4,730	31,300	5,900	4,730	5,700
18	.....	4,480	4,710	5,060	7,900	4,640	33,700	7,370	4,220	2,600
19	.....	5,300	5,060	.....	7,280	4,910	37,200	5,800	3,880	2,210
20	.....	5,800	5,180	.....	7,280	4,300	38,300	3,560	7,010	1,170
21	.....	5,800	5,060	.....	5,180	4,910	39,800	2,760	2,520	54
22	.....	4,380	5,060	5,300	3,100	3,770	38,000	2,710	4,500	286
23	.....	4,840	5,060	5,060	3,350	3,190	36,500	805	2,080	738
24	.....	5,300	5,060	4,820	3,430	863	35,200	36	2,200	36
25	.....	5,300	4,590	4,820	2,940	1,560	33,700	38	549	1,060
26	.....	5,060	5,830	4,590	3,700	1,940	33,500	34	1,950	509
27	.....	4,820	5,830	4,380	4,270	2,820	34,700	26	606	512
28	.....	.....	5,830	4,590	2,490	1,720	33,000	26	769	3,420
29	.....	.....	.....	4,860	2,350	1,970	33,700	26	300	4,640
30	.....	.....	.....	5,110	1,790	7,490	28,900	28	36	2,920
31	.....	.....	.....	5,370	.....	4,730	.....	28	36	.....

NOTE.—No record obtained Oct. 9 to Jan. 14. Discharge interpolated or estimated because of lack of gage heights, Jan. 20-21, 23, Feb. 13, 27, Mar. 2-4, 8, 14-16, 23, and Mar. 29 to Apr. 4.

Discharge estimated from records at other stations as follows: Jan. 28 to Feb. 4, 5,000 second-feet, and Mar. 19-21, 5,500 second-feet.

Monthly discharge of Snake River at Milner, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-8	2,490	2,280	2,390	37,900
January 15-31	5,800	4,380	4,960	167,000
February	5,970	4,590	5,180	288,000
March	6,500	4,380	5,410	333,000
April	7,900	1,790	4,840	288,000
May	10,800	863	5,040	310,000
June	39,800	5,390	24,400	1,450,000
July	20,300	26	4,650	286,000
August	7,010	30	1,590	97,800
September	5,700	30	1,290	76,800

SNAKE RIVER AT KING HILL, IDAHO.

LOCATION.—In sec. 7, T. 5 S., R. 11 E., 300 feet east of Oregon Short Line Railroad station at King Hill, Elmore County. Big Wood River enters from north about 20 miles above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 13, 1909, to September 30, 1918.

GAGE.—Inclined staff on right bank; installed August 17, 1910. Original gage, used from May 13, 1909, to March 1, 1910, was vertical staff on left bank at practically same section as present gage, but at datum 2.2 feet higher; temporary staff gage three-quarters of a mile above present site used from March 7 to August 16, 1910.

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DISCHARGE MEASUREMENTS.—Made from cable 100 feet below gage.

CHANNEL AND CONTROL.—Bed composed chiefly of gravel. Control is lava reef partly overlain with gravel; shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.3 feet June 22 (discharge, 47,200 second-feet); minimum stage, 6.0 feet on several days in July, August, and September (discharge, 7,530 second-feet).

1909–1918: Maximum stage recorded, 16.3 feet June 22, 1918 (discharge, 47,200 second-feet); minimum stage, 4.5 feet July 7–9 and August 15 and 16, 1910 (discharge, 4,760 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—No important diversions for irrigation are made between this station and the station at Milner.

REGULATION.—Flow regulated by diversions at Milner. During certain parts of irrigation season practically entire flow of river is appropriated and flow at King Hill is derived largely from springs and seepage water from Twin Falls tracts.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table and interpolating for days of no gage height. Records good.

COOPERATION.—Gage-height record furnished by United States Reclamation Service.

The following discharge measurement was made by G. C. Baldwin:

May 15: Gage height, 7.94 feet; discharge, 13,200 second-feet.

Daily discharge, in second-feet, of Snake River at King Hill, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1...	9,770	12,400	14,200	10,400	11,700	13,000	11,400	8,310	13,000	32,800	7,530	7,780
2...	10,400	14,100	16,600	11,400	11,700	13,000	11,700	9,170	15,500	26,600	7,530	7,530
3...	11,000	12,400	11,400	11,000	11,400	12,400	13,400	9,470	13,000	20,000	7,530	7,530
4...	11,000	15,900	11,000	11,400	11,700	12,400	13,800	10,400	16,200	17,400	7,530	7,530
5...	11,000	15,900	11,000	10,400	11,700	11,700	13,800	11,000	15,500	16,600	7,780	7,780
6...	11,000	11,400	11,000	14,100	12,000	12,700	13,000	10,700	14,800	15,500	7,780	7,780
7...	10,700	11,400	11,000	14,800	12,400	12,700	13,800	13,000	14,400	15,200	7,780	7,780
8...	11,000	12,000	10,400	15,200	12,400	12,400	12,700	16,200	15,200	14,400	7,780	7,780
9...	16,200	10,100	10,700	14,800	13,000	12,000	11,400	16,600	18,200	13,000	7,530	7,780
10...	13,000	9,770	11,000	9,170	13,800	12,200	11,000	18,800	21,100	13,000	7,530	8,310
11...	12,400	9,770	14,100	14,400	12,700	12,400	10,700	17,400	25,800	12,700	7,530	8,040
12...	12,400	9,770	11,700	15,200	12,000	12,700	10,700	17,000	27,400	12,000	7,530	8,310
13...	12,000	10,400	13,000	12,400	12,700	13,800	10,700	16,600	29,500	10,700	11,000	9,770
14...	12,000	10,400	10,700	12,400	11,700	12,400	10,400	15,500	30,700	10,400	11,000	10,100
15...	11,700	10,400	11,000	12,000	12,700	13,800	11,000	14,400	31,600	12,400	11,000	10,400
16...	13,000	10,400	12,000	12,000	12,700	14,400	12,700	12,700	34,100	11,000	9,470	11,000
17...	12,400	11,000	11,000	12,000	12,700	13,400	13,800	10,700	36,600	11,400	11,000	12,400
18...	13,400	13,200	11,400	12,400	12,400	13,000	13,800	11,400	39,200	12,700	10,700	15,900
19...	12,400	15,500	11,400	12,000	12,000	12,700	15,200	11,000	42,100	13,400	12,000	10,400
20...	12,400	10,400	12,400	12,400	12,400	13,800	13,400	11,400	44,700	12,400	12,400	10,400
21...	15,200	10,700	10,400	13,000	12,400	13,800	13,800	10,700	46,800	11,000	15,900	10,700
22...	17,000	11,700	10,700	13,000	12,400	13,800	11,700	11,400	47,200	9,470	9,770	9,790
23...	12,400	10,700	10,400	13,000	12,400	12,700	9,770	10,400	45,100	9,470	12,400	8,880
24...	13,000	10,700	11,000	12,400	12,400	12,000	9,770	9,170	44,300	8,880	9,170	9,770
25...	13,000	14,400	12,400	13,000	11,700	12,400	10,400	8,310	41,700	8,040	9,170	8,880
26...	12,400	11,000	10,400	12,000	12,400	12,000	9,770	8,040	40,900	7,530	9,170	8,590
27...	12,400	11,400	10,700	12,400	13,000	12,400	9,770	8,040	40,900	7,530	11,000	9,170
28...	14,400	12,700	10,700	12,000	13,000	11,700	10,700	9,470	40,000	7,530	9,470	9,770
29...	17,000	12,200	10,700	13,800	.....	12,400	9,770	9,770	40,000	7,530	8,880	13,400
30...	11,000	11,700	10,400	13,400	.....	12,000	8,310	8,310	36,400	7,530	8,310	13,800
31...	11,400	.....	10,700	13,000	.....	11,700	.....	15,500	.....	7,530	8,040	.....

NOTE.—Discharge interpolated because of lack of gage heights, Nov. 18, 29, Dec. 1, 5, 6, 9, 16, Mar. 10, June 9, 30, Aug. 25, and Sept. 22.

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Monthly discharge of Snake River at King Hill, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum	Mean.	
October	17,000	9,770	12,500	769,000
November	15,900	9,770	11,800	702,000
December	16,600	10,400	11,400	701,000
January	15,200	9,170	12,600	775,000
February	13,800	11,400	12,300	663,000
March	14,400	11,700	12,700	781,000
April	15,200	8,310	11,700	696,000
May	18,800	8,040	12,000	738,000
June	47,200	13,000	30,700	1,830,000
July	32,800	7,530	12,800	787,000
August	15,900	7,530	9,390	577,000
September	15,900	7,530	9,570	569,000
The year	47,200	7,530	13,300	9,610,000

SNAKE RIVER NEAR MURPHY, IDAHO.

LOCATION.—In NW. ¼ sec. 18, T. 2 S., R. 1 E., three-quarters of a mile below Swan Falls power plant, 1¼ miles below company ferry, and 12 miles east of Murphy, Owyhee County. Gage is in Ada County, 38 miles below mouth of Bruneau River.

DRAINAGE AREA.—41,900 square miles (measured on United States Land Office maps).

RECORDS AVAILABLE.—August 21, 1913, to September 30, 1918.

GAGE.—Friez water-stage recorder on right bank a quarter of a mile below house on ranch of S. N. Glass, installed September 7, 1914; inspected by S. N. and J. G. Glass. Temporary vertical staff gage installed August 29, 1912, was replaced August 22, 1913; Friez water-stage recorder, temporarily installed from December 13, 1913, to June 27, 1914. All gages at practically same site and datum. Records prior to August 21, 1913, fragmentary.

DISCHARGE MEASUREMENTS.—Made from ferry boat 1¼ miles above gage.

CHANNEL AND CONTROL.—Bed composed of lava rock overlain with deposits of sand, silt, and gravel, where not scoured out by current. Control subject to shift within well-defined limits. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 13.95 feet at 10 p. m. June 22 (discharge, 47,300 second-feet); minimum stage not definitely determined, but probably occurred during period of no record.

1912–1918: Maximum stage recorded in 1918; minimum stage about −2.25 feet at 6 a. m. August 6, 1917 (discharge, about 5,000 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—A number of small pumping plants divert water for irrigation between this station and that at King Hill.

REGULATION.—Large diurnal fluctuations in stage are due to the manipulation of gates at dam above, and to variation in load at power plant, but because of small amount of storage obtained at dam the changes are of short duration.

ACCURACY.—Stage-discharge relation not permanent during year. Two rating curves used, one well defined applicable October 1 to June 22, the other fairly well defined applicable June 23 to September 6. Operation of water-stage recorder satisfactory. Discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph. Records can not be considered better than fair, as no measurements were made during year.

COOPERATION.—Gage-height record furnished by Idaho Power Co.

No discharge measurements were made during year.

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Daily discharge, in second-feet, of Snake River near Murphy, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8,870	14,000	14,000	13,600	13,100	13,100	12,400	8,570	12,600	39,100	7,180	7,270
2	10,600	14,500	14,300	13,600	11,800	12,900	12,400	8,000	13,800	35,800	6,910	7,180
3	10,600	14,800	14,300	13,800	11,600	12,600	12,600	8,720	14,500		7,180	7,180
4	11,200	15,300	14,000	13,800	11,400	12,400	13,800	9,350	13,800	22,500	7,090	6,910
5	12,000	14,000	14,300	14,000	11,600	12,400	14,000	10,200	15,500		7,000	6,830
6	14,500	15,500	14,300	12,600	11,800	12,000	14,000	10,600	15,500	15,800	7,000	6,830
7	15,300	13,800	14,000	14,000	12,000	12,400	13,600	11,000	15,000	14,800	7,370	
8	15,800	13,800	13,800	14,500	12,200	12,600	14,000	12,900	14,800	14,100	7,370	
9	15,300	13,600	13,800	13,800	12,400	12,600	12,900	15,300	15,800	13,300	7,180	
10	15,000	12,400	13,600	14,800	12,900	12,200	11,800	16,300	19,000	12,600	7,270	
11	13,600	12,000	13,800	11,000	13,300	12,600	11,800	18,100	21,900	11,900	7,180	
12	13,600	11,000	13,300	12,900	13,100	12,900	11,600	17,100	25,200	11,100	6,910	
13	12,900	11,600	13,600	14,500	12,600	12,900	11,600	16,800	27,000	10,400	7,370	
14	13,300	13,100	13,600	13,100	12,000	13,600	11,200	16,300	28,800		10,100	
15	13,600	12,900	13,100	12,400	12,400	12,900	11,400	15,300	30,300		9,930	
16	14,000	12,900	13,100	12,200	12,900	13,300	11,800	14,300	31,900	10,500	9,770	
17	14,400	13,300	13,600	12,200	12,400	14,000	13,300	12,900	33,800		8,680	
18	14,800	13,300	13,300	12,200	12,600	13,600	13,800	11,000	35,800		9,330	
19	15,100	13,600	13,800	12,600	12,400	13,300	14,300	11,600	37,900	10,400	10,100	10,200
20	15,500	15,000	13,600	12,000	12,000	13,100	14,800	11,600	41,200	9,980	10,400	
21	14,500	13,100	13,600	12,400	12,200	13,800	13,800	11,800	44,000	9,380	11,200	
22	15,500	13,600	13,300	12,900	12,400	13,800	13,600	11,200	46,100	8,870	13,100	
23	16,300	13,800	13,600	12,600	12,200	13,800	12,000	11,000	46,100	8,360	9,930	
24	14,800	13,600	12,600	12,900	12,400	13,300	10,400	10,400	45,300	7,850	10,800	
25	14,800	13,600	13,800	12,600	12,600	13,100	10,000	9,190	44,000	7,330	8,440	
26	14,400	13,800	13,600	12,900	12,080	12,900	10,200	8,280	41,600	6,820	9,470	
27	14,000	13,600	13,300	12,400	12,200	13,100	10,000	7,870	40,800	6,310	8,320	
28	14,300	13,600	13,300	12,200	13,100	13,300	10,000	8,280	40,800	6,670	8,800	
29	13,600	14,000	13,300	12,200	.....	12,900	10,800	9,190	39,900	7,470	8,560	
30	16,000	14,300	13,300	12,600	.....	12,900	9,860	10,000	39,500	6,830	7,990	
31	12,950	.....	13,300	13,300	.....	12,600	.....	9,190	.....	6,910	7,770	.....

NOTE.—Braced figures indicate mean discharge for the period; estimated from flow at other stations on Snake River. Discharge interpolated because of no gage heights, Oct. 14-19, 26. Apr. 18, 19, July 8-12, 20-26.

Monthly discharge of Snake River near Murphy, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	16,300	8,870	13,900	855,000
November	15,500	11,000	13,600	809,000
December	14,300	12,600	13,600	836,000
January	14,800	11,000	13,000	799,000
February	13,300	11,400	12,300	683,000
March	14,000	12,000	13,000	799,000
April	14,800	9,860	12,300	732,000
May	18,100	7,870	11,700	719,000
June	46,100	12,600	29,700	1,770,000
July	39,100	6,310	13,000	799,000
August	13,100	6,910	8,570	527,000
September	.....	.....	9,570	569,000
The year	46,100	.....	13,700	9,900,000

SNAKE RIVER AT WEISER, IDAHO.

LOCATION.—In sec. 31, T. 11 N., R. 5 W., a third of a mile above wagon bridge at Weiser, Washington County. Between this station and that near Murphy, Sucker Creek and Owyhee and Malheur rivers enter Snake River on left and Boise, Payette, and Weiser rivers on right.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 8, 1910, to September 30, 1918. Fragmentary gage-height records obtained by Weather Bureau since 1895.

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GAGE.—Inclined concrete gage on right bank; installed by Weather Bureau; read by J. W. Lapish. Gage used October 8, 1910, to September 30, 1914, was inclined staff on right bank 200 yards below wagon bridge at different datum.

DISCHARGE MEASUREMENTS.—Made from cable 200 yards below bridge.

CHANNEL AND CONTROL.—Bed composed of rocks and coarse gravel. Control fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.0 feet June 24 (discharge, 63,400 second-feet); minimum stage, 2.0 feet on several days in July, August, and September (discharge, 7,140 second-feet).

1910–1918: Maximum stage recorded, 14.5 feet (United States Geological Survey gage datum) June 15, 1912 (discharge, 73,800 second-feet); minimum stage, 1.5 feet (Weather Bureau datum) at 8 a. m. August 28 and 29, 1915 (discharge, 5,550 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—Some water is diverted between Weiser and the station near Murphy.

REGULATION.—Diurnal fluctuations during periods of low water due to the operation of Swan Falls power plant above.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good, except for period July to September for which they are fair because of diurnal fluctuations caused by Swan Falls power plant above and infrequency of gage readings.

COOPERATION.—Gage-height record furnished by Weather Bureau.

No discharge measurements were made during year.

Daily discharge, in second-feet, of Snake River near Weiser, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	17,400	20,100	20,100	27,300	18,500	15,500	31,300	21,800	18,500	45,500	7,140	9,610
2	16,000	19,000	20,100	26,100	18,500	15,500	30,600	21,800	22,400	42,600	7,140	9,610
3	13,700	19,000	20,100	24,200	18,000	15,500	29,300	21,800	22,400	38,200	7,140	9,240
4	12,000	17,000	20,100	21,800	18,000	16,000	28,600	22,400	24,800	28,600	7,470	8,870
5	12,000	19,000	19,000	21,800	17,400	16,000	26,700	23,000	25,400	23,000	7,470	8,160
6	12,400	17,400	18,500	21,200	17,400	16,000	25,400	24,200	28,600	19,000	7,470	7,470
7	12,800	18,000	19,000	20,100	17,400	16,500	24,200	27,300	30,600	18,000	7,140	7,140
8	13,300	17,400	19,600	20,100	18,000	16,500	23,000	28,600	32,000	18,000	7,140	7,470
9	13,300	17,400	17,400	19,600	18,000	16,500	28,000	30,600	33,300	16,000	7,140	7,470
10	13,300	17,000	17,400	19,600	18,000	17,000	30,000	32,600	34,000	15,500	7,140	7,810
11	15,000	16,000	17,400	19,000	17,400	17,000	31,300	32,600	41,800	15,000	7,140	8,160
12	15,000	16,000	17,400	18,000	17,400	17,400	31,300	33,300	45,500	14,100	7,140	8,510
13	15,000	16,000	17,400	18,000	17,400	17,400	30,600	32,600	50,700	13,700	7,140	8,870
14	15,000	16,000	18,000	18,000	17,400	18,000	30,600	31,300	53,800	12,400	7,140	8,870
15	15,500	16,500	18,000	18,000	17,000	19,000	30,000	30,600	55,400	11,600	7,470	9,990
16	15,500	16,500	17,400	17,400	17,000	19,600	28,600	29,300	55,400	11,600	7,470	11,200
17	15,500	16,500	17,400	17,400	17,000	21,200	28,600	27,300	54,600	11,600	7,470	11,200
18	16,000	16,500	17,400	17,400	17,000	23,000	28,000	26,100	53,800	11,600	7,470	12,800
19	16,500	16,500	17,400	18,000	17,000	25,400	27,300	21,200	56,900	11,600	7,470	12,400
20	17,400	16,500	18,000	18,000	16,500	27,300	26,100	21,200	58,400	11,600	7,810	11,600
21	17,000	17,000	20,100	18,000	16,500	26,700	26,100	19,600	60,000	11,200	7,810	11,600
22	17,000	17,000	20,100	18,000	16,500	27,300	26,100	19,600	60,800	10,800	7,810	11,600
23	18,000	17,000	20,100	17,400	16,000	28,000	26,100	20,100	61,600	10,400	8,160	11,600
24	17,400	17,000	20,100	17,400	16,000	28,000	25,400	18,500	63,400	9,990	8,510	11,600
25	17,000	17,400	21,200	17,400	16,000	29,300	24,800	18,000	57,700	9,610	12,800	11,200
26	17,000	17,400	23,000	17,400	15,500	30,600	24,800	19,000	55,400	8,870	10,800	11,200
27	17,000	17,400	25,000	17,400	15,500	32,600	24,200	16,500	52,300	8,510	9,990	10,800
28	17,000	18,000	28,000	18,000	15,500	34,700	23,600	16,000	50,000	8,160	9,610	10,400
29	16,500	18,500	33,300	18,000	.....	36,100	22,400	16,500	47,800	7,470	9,610	11,200
30	16,500	20,100	30,600	18,000	.....	33,300	21,800	17,000	47,000	7,140	9,610	12,400
31	20,100	.....	29,300	18,500	.....	31,300	.....	18,500	.....	7,140	9,610	.....

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Monthly discharge of Snake River at Weiser, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	20,100	12,000	15,600	959,000
November	20,100	16,000	17,400	1,040,000
December	33,300	17,400	20,600	1,270,000
January	27,300	17,400	19,200	1,180,000
February	18,500	15,500	17,100	950,000
March	36,100	15,500	22,700	1,400,000
April	31,300	21,800	27,200	1,620,000
May	33,300	16,000	23,800	1,460,000
June	63,400	18,500	45,100	2,680,000
July	45,500	7,140	15,800	972,000
August	12,800	7,140	8,080	497,000
September	12,800	7,140	10,000	595,000
The year	63,400	7,140	20,200	14,600,000

SNAKE RIVER AT RIPARIA, WASH.

LOCATION.—In sec. 31, T. 13 N., R. 38 W., at Oregon-Washington Railroad & Navigation Co.'s bridge at Riparia, Whitman County.

DRAINAGE AREA.—102,000 square miles (measured by Weather Bureau).

RECORDS AVAILABLE.—October 1, 1915, to September 30, 1918. Gage-height record May and June 1900-1902, May 1 to November 30, 1904; July 1, 1905, to December 31, 1906; February 1, 1908, to June 30, 1910; and August 1, 1910, to February 28, 1917, obtained and published by Weather Bureau.

GAGE.—Chain gage on downstream side of railroad bridge, installed September 12, 1917; read by R. E. Wilcox. Previous gage was vertical staff in three sections; referred to same datum.

DISCHARGE MEASUREMENTS.—Made from bridge at gage.

CHANNEL AND CONTROL.—Control for stages above low water is Texas Rapids, a solid lava bed half a mile below gage; permanent. Low-water control is sand and gravel channel above rapids; subject to change during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.0 feet June 14 and 15 (discharge, 216,000 second-feet); minimum stage recorded, 1.4 feet September 8 and 9 (discharge, 15,000 second-feet).

1916-1918: Maximum stage recorded, 18.2 feet May 30, 1917 (discharge, 256,000 second-feet); minimum stage recorded in 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—A large amount of water is diverted for irrigation.

REGULATION.—Flow is regulated to some extent by storage for irrigation in Jackson Lake reservoir (capacity, 847,000 acre-feet) and in other smaller reservoirs in basin; also by diversions for irrigation.

ACCURACY.—Stage-discharge relation below 65,000 second-feet changed slightly during high water in June. Rating curves well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

Discharge measurements of Snake River at Riparia, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 8	T. R. Newell	3.25	28,300
Mar. 23	do	7.63	74,900
May 20-21.	R. B. Kilgore	8.78	93,000

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Daily discharge, in second-feet, of Snake River at Riparia, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	26,400	25,600	29,800	131,000	43,600	36,000	95,300	103,000	93,800	86,300	21,000	17,300
2	28,000	25,600	31,500	120,000	36,900	35,100	93,800	111,000	87,800	80,700	20,300	16,800
3	28,000	26,400	35,100	108,000	39,800	35,100	87,800	122,000	83,500	77,900	20,300	16,800
4	27,200	26,400	33,300	92,300	41,600	36,000	84,900	131,000	92,300	67,200	19,000	16,300
5	25,600	26,400	32,400	90,800	42,600	37,800	76,500	155,000	101,000	64,600	19,000	15,800
6	21,900	26,400	30,600	89,300	46,600	39,800	72,400	166,000	117,000	60,800	18,400	15,400
7	21,900	27,200	29,800	87,800	47,600	39,800	69,800	153,000	131,000	57,200	17,800	15,400
8	21,900	27,200	28,000	87,800	58,600	36,900	68,500	141,000	151,000	46,000	17,800	15,000
9	21,900	26,400	26,400	86,300	61,000	36,900	80,700	134,000	167,000	44,000	19,000	15,000
10	21,900	25,600	23,300	79,300	55,100	36,000	87,800	124,000	173,000	42,000	19,000	15,000
11	21,900	25,600	25,600	77,900	48,600	36,900	95,300	119,000	184,000	41,000	18,400	15,400
12	21,900	26,400	27,200	69,800	48,600	36,900	109,000	112,000	189,000	40,000	17,800	15,800
13	21,900	26,400	28,000	61,000	48,600	42,600	111,000	108,000	198,000	38,000	17,800	15,800
14	24,000	26,400	30,600	57,400	48,600	44,600	114,600	119,000	216,000	36,000	18,400	16,300
15	23,300	24,800	38,800	56,200	46,600	44,600	104,000	127,000	216,000	34,000	18,400	16,300
16	23,300	23,300	37,800	55,100	45,600	43,600	99,800	134,000	194,000	34,000	16,800	17,300
17	24,000	24,800	36,000	52,900	44,600	45,600	96,800	127,000	180,000	34,000	17,300	17,800
18	24,000	24,800	43,600	50,700	43,600	47,600	84,900	131,000	173,000	32,000	17,300	17,800
19	23,300	24,800	75,100	52,900	41,600	57,400	80,700	111,000	166,000	29,200	17,800	18,400
20	24,000	24,800	117,000	51,800	39,800	64,600	76,500	99,800	153,000	28,300	18,400	19,600
21	24,800	24,800	86,300	51,800	36,000	71,100	80,700	92,300	153,000	27,400	21,700	20,300
22	24,800	23,300	67,200	48,600	35,100	73,700	84,900	83,500	144,000	26,500	26,500	20,300
23	24,800	23,300	62,200	47,600	34,200	76,500	93,800	82,100	143,000	26,500	26,500	20,300
24	24,800	24,000	89,300	44,600	35,100	80,700	84,900	80,700	141,000	26,500	25,600	19,000
25	26,400	24,800	86,300	50,700	35,100	92,300	86,300	80,700	138,000	26,500	24,800	17,800
26	28,000	24,800	72,400	68,500	34,200	98,300	101,000	77,900	138,000	26,500	24,800	17,800
27	28,000	24,800	61,000	63,400	36,900	108,000	95,300	75,100	131,000	26,500	24,000	19,600
28	26,400	26,400	116,000	55,100	36,000	111,000	92,300	72,400	117,000	26,500	21,000	19,600
29	26,400	26,400	151,000	52,900	.....	101,000	92,300	73,700	95,300	26,500	17,800	19,000
30	25,600	28,000	180,000	51,800	.....	95,300	95,300	75,100	89,300	25,600	17,800	19,000
31	24,800	.....	153,000	47,600	.....	95,300	.....	80,700	.....	24,000	17,300	.....

Monthly discharge of Snake River at Riparia, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	28,000	21,900	24,500	1,510,000
November	28,000	23,300	25,500	1,520,000
December	180,000	23,300	60,800	3,740,000
January	131,000	44,600	69,100	4,250,000
February	61,000	34,200	43,300	2,400,000
March	111,000	35,100	59,300	3,650,000
April	114,000	68,500	89,900	5,350,000
May	166,000	72,400	110,000	6,760,000
June	216,000	83,500	145,000	8,630,000
July	86,300	24,000	40,700	2,500,000
August	26,500	16,800	19,900	1,220,000
September	20,300	15,000	17,400	1,040,000
The year	216,000	15,000	58,800	42,600,000

TRIBUTARY BASINS.

PACIFIC CREEK NEAR MORAN, WYO.

LOCATION.—On line between secs. 22 and 23, T. 45 N., R. 114 W., 500 feet below highway bridge on road from Moran to Jackson, 5 miles east of Moran, Lincoln County, and half a mile above mouth of creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 20, 1917, to September 30, 1918, when station was discontinued.

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GAGE.—Vertical staff in two sections on right bank, installed June 12, 1918, about 40 feet upstream from former gage and set at a datum 1.22 feet higher; read by R. B. Lozier. Vertical staff used in previous season washed out by high water.

DISCHARGE MEASUREMENTS.—Made by wading or from two highway bridges 500 feet above gage.

CHANNEL AND CONTROL.—Bed composed of gravel; shifts occasionally. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.98 feet at 9.30 a. m. June 15 (discharge, 3,030 second-feet); minimum stage, 0.20 foot at 6 p. m. September 7 (discharge, 62 second-feet).

1917-1918: Maximum and minimum stages recorded in 1918.

ICE.—Records discontinued during winter.

DIVERSIONS.—None below gage nor for distance of 3 miles above.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Two rating curves used, one well defined, used June 12 to September 11, the other fairly well defined, used September 24-30. Shifting-control method used September 12-23. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Pacific Creek near Moran, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 5	William Kessler	0.70	70.7	Aug. 7	T. R. Newell	0.53	126
June 12	T. R. Newell	3.73	2,650	25	do	.33	89.1
29	do	2.18	898	Sept. 1	do	.24	69.8
July 19	do	.92	275	11	do	.30	79.0
24	do	.72	194	24	do	.24	77.1

Daily discharge, in second-feet, of Pacific Creek near Moran, Wyo., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June	July.	Aug.	Sept.
1		786	131	69	16	2,980	340	123	71
2		704	131	69	17	2,810	323	118	71
3		737	148	67	18	2,600	302	110	67
4		662	140	66	19	2,480	270	102	66
5		646	134	66	20	2,310	253	102	67
6		635	131	64	21	2,140	236	102	69
7		532	134	62	22	1,770	220	91	69
8		482	128	73	23	1,640	208	91	71
9		448	128	66	24	1,510	203	82	75
10		420	123	76	25	1,380	203	84	69
11		388	120	78	26	1,260	196	78	71
12	2,640	357	123	71	27	1,140	189	76	69
13	2,770	482	120	69	28	1,020	189	76	71
14	2,900	458	120	80	29	899	176	75	69
15	3,030	366	120	76	30	825	151	75	73
					31		134	73	

NOTE.—Discharge interpolated because of lack of gage heights, June 13-14, 23-28, and July 20-22.

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Monthly discharge of Pacific Creek near Moran, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 12-30	3,030	825	2,010	75,700
July	786	134	377	23,200
August	148	73	109	6,700
September	80	62	70	4,170
The period				110,000

BUFFALO FORK NEAR MORAN, WYO.

LOCATION.—In SE. ¼ sec. 26, T. 45 N., R. 114 W., 1½ miles north of Elk post office, half a mile above mouth of river, at highway bridge on road from Moran to Jackson, and 6 miles east of Moran, Lincoln County.

DRAINAGE AREA.—378 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 9, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff fastened to downstream side of left abutment of highway bridge; installed July 21, 1917; read by Mrs. J. G. Brown. A vertical staff, about 500 feet above present location was used for period July 9-20, 1917.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading 600 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel, shifting occasionally during high water. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.78 feet at 11.15 a. m. June 13 (measured discharge, 5,840 second-feet); minimum stage, 0.51 foot September 29 (discharge, 238 second-feet).

1917-1918: Maximum and minimum stages occurred in 1918.

ICE.—Record discontinued during winter.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Buffalo Fork near Moran, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 5	William Kessler	1.00	239	Aug. 9	T. R. Newell	1.35	535
June 13	T. R. Newell	6.78	[a] 5,840	23	do	.92	339
29	do	4.36	3,450	Sept. 12	do	.65	282
July 23	do	2.54	1,180	25	do	.64	277
Aug. 7	do	1.46	566				

[a] Estimate for overflow in side channel included.

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Daily discharge, in second-feet, of Buffalo Fork near Moran, Wyo., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		2,980	725	306	16		1,770	481	318
2		2,970	826	302	17		1,630	466	277
3		2,900	751	302	18		1,630	409	271
4		2,650	751	302	19		1,520	402	262
5		2,520	686	290	20		1,460	398	253
6		3,280	644	277	21		1,440	381	247
7		2,810	582	277	22		1,260	375	247
8		2,530	552	277	23		1,150	368	259
9		2,620	524	351	24		1,100	361	284
10		2,040	612	322	25		1,100	348	271
11		1,980	481	296	26		951	341	247
12		1,950	466	277	27		849	348	244
13		1,840	430	277	28	3,920	821	335	241
14		2,080	455	271	29	3,440	788	335	238
15		1,810	489	426	30	2,980	767	318	274
					31		746	309	

Monthly discharge of Buffalo Fork near Moran, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 28-30	3,920	2,980	3,450	20,500
July	3,280	746	1,800	111,000
August	826	309	482	29,600
September	426	238	283	16,800
The period				178,000

SPREAD CREEK NEAR ELK, WYO.

LOCATION.—In NW. ¼ sec. 9, T. 44 N., R. 114 W., 50 feet below heading of Wolff ditch, 500 feet above bridge on road from Moran to Jackson, 1½ miles above mouth of creek, and 3 miles south of Elk post office, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 14, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on right bank; read by W. E. Wolff. Staff used during 1917 was on right bank 200 feet below present site.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Bed composed of loose gravel; shifting. No well-defined control. Banks are low and subject to overflow at medium stages. Two channels at low stages; numerous channels at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.60 feet at 6.30 p. m. June 15 (discharge, 715 second-feet); minimum stage, 2.18 feet at 7.30 p. m. September 4 (discharge, 48 second-feet).

1917-1918: Maximum and minimum stages recorded in 1918.

ICE.—Record discontinued during winter.

DIVERSIONS.—Wolff canal, a quarter of a mile above gage, diverts a maximum of 3 second-feet. No diversions of any size below gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Three fairly well defined rating curves used; one applicable June 13-25, one July 18-21, and the other July 22 to September 30. Shifting-control method used June 26 to July 17. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

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Discharge measurements of Spread Creek near Elk, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	William Kessler	0.85	61.1	Aug. 6	T. R. Newell	2.42	81.7
June 14	T. R. Newell	4.40	666	25	do	2.28	60.5
24	do	3.81	517	Sept. 1	do	2.21	51.7
July 18	do	2.74	139	12	do	2.20	51.3
25	do	2.78	136	25	do	2.22	53.4

Daily discharge, in second-feet, of Spread Creek near Elk, Wyo., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		298	89	53	16	700	159	77	52
2		280	80	53	17	690	143	73	50
3		273	89	52	18	630	136	70	52
4		225	89	48	19	632	131	69	50
5		238	86	49	20	590	132	66	50
6		234	80	50	21	618	131	66	52
7		221	77	49	22	465	121	64	52
8		213	76	50	23	470	124	66	53
9		176	77	52	24	525	121	62	52
10		170	77	53	25	542	134	60	53
11		167	74	52	26	444	132	59	52
12		157	76	50	27	418	108	59	50
13	570	146	76	50	28	403	108	60	50
14	678	152	84	50	29	325	103	59	50
15	715	129	82	52	30	314	102	59	53
					31		92	58	

Monthly discharge of Spread Creek near Elk, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 13-30	715	314	540	19,300
July	298	92	163	10,000
August	89	58	72.2	4,440
September	53	48	51.1	3,040
The period				36,800

SPRING CREEK NEAR TETON, WYO.

LOCATION.—In NE. ¼ sec. 24, T. 43 N., R. 116 W., 200 yards above mouth of creek and 5 miles northeast of Teton post office, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 16, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on right bank; read only when station was visited by engineer.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of loose gravel. Control formed by gravel riffle; shifting.

EXTREMES OF DISCHARGE.—Data too few.

ICE.—Record discontinued during winter.

DIVERSIONS.—None.

REGULATION.—None.

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ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read only when visited by engineer. Daily discharge ascertained by applying daily gage height to rating table and interpolating for days of no gage height. Records fair, chiefly because of infrequent gage readings.

Discharge measurements of Spring Creek near Teton, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	William Kessler	1.38	23.1	Aug. 12	T. R. Newell	1.41	29.3
June 8	T. R. Newell	1.42	29.4	29	do	1.39	26.4
July 1	do	1.43	32.3	Sept. 9	do	1.38	26.0
26	do	1.41	27.5	22	do	1.35	23.2

Daily discharge, in second-feet, of Spring Creek near Teton, Wyo., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	.....	31	29	26	16	30	30	29	24
2	.....	31	29	26	17	30	30	28	24
3	.....	31	29	26	18	31	29	28	24
4	.....	31	29	26	19	31	29	28	24
5	.....	30	29	26	20	31	29	28	24
6	.....	30	29	26	21	31	29	28	24
7	.....	30	29	26	22	31	29	28	23
8	30	30	29	26	23	31	29	28	23
9	30	30	29	26	24	31	29	28	
10	30	30	29	25	25	31	29	28	
11	30	30	29	25	26	31	29	27	23
12	30	30	29	25	27	31	29	27	
13	30	30	29	25	28	31	29	27	
14	30	30	29	25	29	31	29	27	
15	30	30	29	25	30	31	29	27	
					31	.....	29	26	.....

NOTE.—Discharge interpolated June 9-26, 28-30; July 2-8, 10-25, July 27-Aug. 11, Aug. 13-21, 23-28, 30, Sept. 1-8, 10-21; estimated Sept. 24-30. Braced figure shows mean discharge for period indicated.

Monthly discharge of Spring Creek near Teton, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 8-30	31	30	30.6	1,400
July	31	29	29.7	1,830
August	29	26	28.3	1,740
September	26	23	24.5	1,460
The period	.....	.....	.....	6,430

COTTONWOOD CREEK NEAR TETON, WYO.

LOCATION.—In SE. ¼ sec. 14, T. 43 N., R. 116 W., 1½ miles above mouth of creek and 5 miles northeast of Teton post office, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 16, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on left bank; read by C. S. Horel. Gage used during 1917 was vertical staff on right bank one-eighth mile above mouth of creek.

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DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Control of coarse gravel; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 4.5 feet June 26 (discharge, 1,180 second-feet); a higher stage is reported to have occurred on June 16-18 (discharge not determined). Minimum stage, 2.18 feet at 7 p. m. September 30 (discharge, 40 second-feet).

1917-1918: Maximum and minimum stages recorded in 1918.

ICE.—Observations discontinued during winter.

DIVERSIONS.—None within 3 miles above or below gage.

REGULATION.—No artificial regulation; stream is outlet of Jenny and Taggart lakes and flow is therefore fairly regular.

ACCURACY.—Stage-discharge relation considered permanent. Rating curve well defined. Gage read to half-tenths twice daily until September 1 and thereafter to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Cottonwood Creek near Teton, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	William Kessler	0.33	40.4	Aug. 12	T. R. Newell	2.96	180
June 8	T. R. Newell	1.64	435	29	do	2.71	105
27	do	4.33	1,020	Sept. 10	do	2.50	66.8
July 1	do	3.86	637	22	do	2.26	44.7
26	do	3.25	298				

Daily discharge, in second-feet, of Cottonwood Creek near Teton, Wyo., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		651	241	95	16		493	165	60
2		613	296	87	17		481	176	60
3		651	332	83	18		481	158	55
4		600	313	80	19		481	158	51
5		588	313	77	20		453	158	47
6		588	284	69	21		453	143	46
7		588	254	67	22		425	143	45
8	435	570	232	67	23		453	123	45
9		551	201	70	24		414	108	44
10		570	193	67	25		372	103	43
11		551	193	67	26	1,180	317	103	42
12		527	186	65	27	1,050	290	103	42
13		493	165	62	28	900	275	103	41
14		510	165	61	29	832	254	103	41
15	1,110	493	165	61	30	700	232	103	40
					31		254	101	

NOTE.—Discharge estimated July 27.

Monthly discharge of Cottonwood Creek near Teton, Wyo., for the year ending Sept. 30, 1918.

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 26-30	1,180	700	932	9,240
July	651	232	473	29,100
August	332	101	179	11,000
September	95	40	59.3	3,530
The period				52,900

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SPRING CREEK NEAR ZENITH, WYO.

LOCATION.—In NE. ¼ sec. 32, T. 42 N., R. 116 W., 200 feet above mouth of creek and half a mile west of Zenith post office, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 24, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Reference stake on left bank, a short distance below forks of creek; read when station was visited by engineer. During 1917 reference stake was fastened to tree on right bank, at about same location; relation between two gages not determined.

DISCHARGE MEASUREMENTS.—Made by wading in several channels near gage.

CHANNEL AND CONTROL.—Bed composed of gravel and sand. Control formed by series of rapids; shifting. Several channels, number varying with stage.

EXTREMES OF DISCHARGE.—Data too few.

ICE.—Records discontinued during winter.

DIVERSIONS.—None.

REGULATION.—Flow regulated by springs, swamps, and seepage from irrigation ditches above, which divert from Gros Ventre River.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined. Gage read only when station was visited by engineer. Daily discharge ascertained by applying daily gage height to rating table, using actual measurements, and interpolating for days of no gage height. Records fair.

Discharge measurements of Spring Creek near Zenith, Wyo., during the year ending Sept. 30, 1918.

[Made by T. R. Newell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 22	1.12	[a] 33.2	July 27	2.05	[b] 80.2	Sept. 14	1.57	21.7
July 10	.90	[a] 22.1	Aug. 13	1.67	[c] 33.1	26	1.48	18.2
11	1.69	35.5	28	1.58	24.3			

[a] Flow measured in only two channels, third channel submerged by water from Snake River.
[b] Includes 46.2 second-feet from Snake River.
[c] Includes 8.6 second-feet from Snake River.

Daily discharge, in second-feet, of Spring Creek near Zenith, Wyo., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		42	31	23	16		34	25	21
2		41	31	23	17		33	25	21
3		40	30	23	18		33	25	21
4		40	30	23	19		33	25	20
5		39	29	23	20		33	25	20
6		38	29	23	21		33	25	20
7		38	28	23	22	47	34	25	19
8		37	28	23	23	46	34	25	19
9		37	27	23	24	46	34	25	19
10		36	27	23	25	45	34	24	19
11		35	26	23	26	45	34	24	18
12		34	26	23	27	44	34	24	18
13		34	25	23	28	43	33	24	18
14		34	25	22	29	43	33	23	18
15		34	25	21	30	42	32	23	18
					31		32	23	

NOTE.—Used actual measurements corrected for inflow from Snake River, July 27 and Aug. 13. Used actual measurement direct, Aug. 28 and Sept. 14. Estimated June 22 and July 10, on basis of partial measurements. Estimated Sept. 28-30. Interpolated because of lack of gage heights for all other periods.

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Monthly discharge of Spring Creek near Zenith, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 22-30	47	42	44.6	796
July	42	32	35.2	2,160
August	31	23	26.0	1,600
September	23	18	21.0	1,250
The period				5,810

GROS VENTRE RIVER AT KELLY, WYO.

LOCATION.—At corner of secs. 1, 2, 11, and 12, T. 42 N., R. 115 W., in Kelly, Lincoln County, 300 feet below highway bridge on main road from Jackson to Moran. Nearest tributary, Turpin Creek, enters 2 miles upstream.

DRAINAGE AREA.—725 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 16 to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on left bank; read by W. Kelly and J. Gamp.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 200 feet above gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Control of same material; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 9.95 feet at 6 p. m. June 16 (discharge, 6,220 second-feet); minimum stage, 3.31 feet at 6 p. m. September 24-27, 29 and 30 (discharge, 245 second-feet).

ICE.—No record.

DIVERSIONS.—Canals above and below gage divert about 200 second-feet during irrigation season.

REGULATION.—None, except that due to diversions.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Gros Ventre River at Kelly, Wyo., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 16	T. R. Newell	9.95	[a]6,960	Aug. 15	T. R. Newell	3.79	398
21	do	9.41	5,620	26	do	3.50	296
25	do	7.76	3,570	31	Newell and Baldwin	3.42	273
July 13	do	5.03	1,150	Sept. 15	T. R. Newell	3.50	304
29	do	4.07	515	28	do	3.36	256

[a] Surface velocity by floats; coefficient of 0.90 used to reduce to mean velocity.

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Daily discharge, in second-feet, of Gros Ventre River at Kelly, Wyo., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	.....	1,600	510	278	16	6,220	1,360	384	272
2	.....	1,600	510	272	17	5,760	1,200	369	272
3	.....	1,600	498	272	18	5,290	1,040	369	272
4	.....	1,520	486	272	19	4,830	971	341	272
5	.....	1,440	455	269	20	4,410	900	328	266
6	.....	1,600	446	272	21	5,590	831	318	258
7	.....	1,440	414	287	22	4,530	702	318	258
8	.....	1,400	406	302	23	4,950	642	318	250
9	.....	1,400	398	334	24	4,190	603	309	245
10	.....	1,400	387	309	25	3,530	586	309	245
11	.....	1,280	376	296	26	3,040	560	299	245
12	.....	1,130	369	278	27	3,140	534	296	245
13	.....	1,140	362	278	28	2,570	524	296	256
14	.....	1,200	351	287	29	1,860	520	296	245
15	.....	1,520	398	299	30	1,680	515	287	245
					31	.....	510	278	.....

NOTE.—Discharge interpolated because of lack of gage heights, June 17, 18, July 30, Aug. 1, 3, and 16.

Monthly discharge of Gros Ventre River at Kelly, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 16-30	6,220	1,680	4,110	122,000
July	1,600	510	1,070	65,800
August	510	278	370	22,900
September	334	245	272	16,200
The period	.....	.....	.....	227,000

GROS VENTRE RIVER AT ZENITH, WYO.

LOCATION.—In NW. ¼ sec. 4, T. 41 N., R. 116 W., three-fourths mile above mouth of river and three-fourths mile south of Zenith post office, Lincoln County.

DRAINAGE AREA.—758 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 13, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on right bank; read by H. Barber and Jo Deyo. Gage used during 1917 was on right bank one-fourth mile below present location; relation between gages not determined.

DISCHARGE MEASUREMENTS.—Made by wading in several channels below gage.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; practically permanent. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.9 feet at 7 a. m. July 15 (discharge, 934 second-feet); minimum stage, 1.35 feet at 6.20 p. m. September 6 (discharge, 121 second-feet).

1917-1918: Maximum stage recorded, 3.30 feet on 1917 gage at 5.30 p. m. July 13 (discharge, 1,800 second-feet); minimum stage recorded in 1918.

ICE.—Records discontinued during winter.

DIVERSIONS.—Canals above gage divert about 200 second-feet during irrigation season.

REGULATION.—None, except that caused by change of headgates on diversions.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 440 second-feet. Gage read to quarter-tenths twice daily prior to July 31 and once daily thereafter. Daily discharge ascertained by applying daily gage height to rating table. Records good.

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Discharge measurements of Gros Ventre River at Zenith, Wyo., during the year ending Sept. 30, 1918.

[Made by T. R. Newell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
July 28	1.97	400	Aug. 14	1.58	215	Sept. 15	1.52	187
Aug. 5	1.77	298	27	1.47	171	27	1.44	153

Daily discharge, in second-feet, of Gros Ventre River at Zenith, Wyo., for the year ending Sept. 30, 1918.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1		340	179	11	824	222	200	21	578	196	139
2		327	159	12	740	200	179	22	533	244	155
3		314	159	13	699	179	179	23	522	179	159
4		290	179	14	849	200	179	24	489	179	139
5		300	159	15	897	179	183	25	467	139	159
6		267	121	16	782	222	179	26	440	179	159
7		222	139	17	705	200	179	27	414	171	151
8		222	159	18	693	222	159	28	394	159	139
9		200	222	19	635	200	159	29	368	139	139
10		179	200	20	624	179	159	30	353	179	139
								31	353	163	

NOTE.—Gage not read Aug. 1 and 2; discharge interpolated.

Monthly discharge of Gros Ventre River at Zenith, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July 11–31	897	353	589	24,500
August	340	139	213	13,100
September	222	121	164	9,760
The period				47,400

SPRING CREEK AT WEST GROS VENTRE BUTTE, WYO.

LOCATION.—In NE. ¼ sec. 5, T. 41 N., R. 116 W., at West Gros Ventre Butte, Lincoln County, half a mile above mouth of creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 24, 1917, to September 30, 1918, when station was discontinued. Discharge measurements only, prior to June 19, 1918.

GAGE.—Vertical staff fastened to tree on right bank; read when station was visited by engineer.

DISCHARGE MEASUREMENTS.—Made by wading 300 feet below gage.

CHANNEL AND CONTROL.—Bed composed of sand, gravel, and small boulders; shifting. Control affected by growth of aquatic plants.

EXTREMES OF DISCHARGE.—Data too few.

ICE.—No record.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curves poorly defined. Gage read only when visited by engineer. Daily discharge ascertained by applying daily gage height to rating table, using actual measurements, and interpolating for days of no gage height. Records poor.

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Discharge measurements of Spring Creek at West Gros Ventre Butte, Wyo., during the year ending Sept. 30, 1918.

[Made by T. R. Newell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 19	1.87	33.6	Aug. 14	1.70	21.0	Sept. 14	1.67	19.7
July 13	1.81	29.7	27	1.68	20.1	27	1.65	19.3
29	1.71	23.2						

Daily discharge, in second-feet, of Spring Creek at West Gros Ventre Butte, Wyo., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		33	23	20	16		29	21	20
2		33	22	20	17		29	21	20
3		33	22	20	18		28	21	20
4		33	22	20	19	34	28	21	20
5		33	22	20	20	33	27	21	20
6		33	22	20	21	33	27	21	19
7		33	22	20	22	33	26	21	19
8		33	22	20	23	33	26	21	19
9		33	22	20	24	33	26	20	19
10		33	21	20	25	33	25	20	19
11		32	21	20	26	33	25	20	19
12		31	21	20	27	33	24	20	19
13		30	21	20	28	33	24	20	19
14		30	21	20	29	33	23	20	19
15		30	21	20	30	33	23	20	19
					31		23	20	

NOTE.—Used actual measurements June 19, July 13, 29, Aug. 14, 27, Sept. 14 and 27. Discharge interpolated because of lack of gage heights, June 20 to July 10, July 12, 14–16, 18–28, 30, 31, Aug. 1–4, 6–13, 16–20, 22–26, 28–31, Sept. 1–13, 15–26, and 28–30.

Monthly discharge of Spring Creek at West Gros Ventre Butte, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 19-30	34	33	33.1	788
July	33	23	28.9	1,780
August	23	20	21.1	1,300
September	20	19	19.7	1,170
The period				5,040

SPRING CREEK AT ZENITH, WYO.

LOCATION.—In SE. ¼ sec. 32, T. 42 N., R. 116 W., a quarter of a mile above mouth of creek and three-quarters of a mile southwest of Zenith post office, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 24, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Reference stake on right bank; read when station was visited by engineer. Reference stake used during 1917 was at practically same location; relation between gages not determined.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and sand, well covered with moss; shifting. No well-defined control.

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EXTREMES OF DISCHARGE.—Data too few.

ICE.—Records discontinued during winter.

DIVERSIONS.—None.

REGULATION.—Flow regulated by springs and swamps, and is fairly uniform.

ACCURACY. Stage-discharge relation not permanent. Rating curve poorly defined. Gage read only occasionally by engineer. Daily discharge ascertained by applying daily gage height to rating table, using actual measurements, and interpolating for days of no gage height, except for September 28–30, for which it was estimated. Records poor.

Discharge measurements of Spring Creek at Zenith, Wyo., during the year ending Sept. 30, 1918.

[Made by T. R. Newell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 22	1.85	48.3	Aug. 13	1.72	21.4	Sept. 14	1.68	17.1
July 11	1.56	26.8	28	1.66	18.7	27	1.60	15.9
28	1.61	24.8						

Daily discharge, in second-feet, of Spring Creek at Zenith, Wyo., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		38	24	18	16		28	20	17
2		37	23	18	17		28	20	17
3		36	23	18	18		27	20	17
4		35	23	18	19		27	20	17
5		34	22	18	20		27	20	16
6		33	22	18	21		27	19	16
7		31	22	18	22	48	27	19	16
8		30	22	18	23	47	26	19	16
9		29	22	18	24	46	26	19	16
10		28	21	18	25	45	26	19	16
11		27	21	18	26	44	26	19	16
12		27	21	18	27	42	26	19	16
13		27	21	18	28	41	25	19	16
14		28	21	17	29	40	24	18	16
15		28	21	17	30	39	24	18	16
					31		24	18	

NOTE.—Used actual measurements June 22, July 11, 28, and Sept. 14. Estimated Sept. 28–30, 16 second-feet. Discharge interpolated June 23 to July 10, July 12–16, 18–27, 29–31, Aug. 1–4, 6–12, 16–20, 22–27, 29–31, Sept. 1–13, and 15–25.

Monthly discharge of Spring Creek at Zenith, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 22–30	48	39	43.6	778
July	38	24	28.6	1,760
August	24	18	20.5	1,260
September	18	16	17.1	1,020
The period				4,820

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FISH CREEK NEAR WILSON, WYO.

LOCATION.—About sec. 27, T. 41 N., R. 117 W. (unsurveyed), 300 feet above mouth of creek and 4 miles southeast of Wilson, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 20, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank, at same location and datum as vertical staff used during 1917; inspected by T. R. Newell.

DISCHARGE MEASUREMENTS.—Made by wading in two channels above gage.

CHANNEL AND CONTROL.—Bed covered by heavy growth of moss. Control formed by backwater from small irrigating dam at mouth of creek; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and for period of record, 2.13 feet July 3 (discharge, 622 second-feet); minimum discharge, 134 second-feet September 25, at stage of 1.07 feet.

ICE.—Station discontinued during winter.

DIVERSIONS.—Several small diversions during irrigation season.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined. Operation of recorder satisfactory. Daily discharge ascertained by applying daily gage height to rating table; shifting-control method used August 19 to September 30. Records prior to August 19 good, after that date fair.

Discharge measurements of Fish Creek near Wilson, Wyo., during the year ending Sept. 30, 1918.

[Made by T. R. Newell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 6	1.94	463	Aug. 1	1.08	252	Sept. 17	1.00	145
July 3	2.14	637	18	.90	194	30	1.15	135
15	1.69	451	Sept. 8	.92	156			

Daily discharge, in second-feet, of Fish Creek near Wilson, Wyo., for the year ending Sept. 30, 1918.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	690	246	151	11	472	204	146	21	351	190	140
2	650	240	154	12	443	195	146	22	337	187	140
3	622	243	151	13	447	192	144	23	323	182	140
4	611	240	149	14	476	198	146	24	317	176	138
5	569	233	146	15	457	204	151	25	307	171	134
6	569	233	151	16	439	201	144	26	290	173	136
7	546	224	151	17	418	198	144	27	281	168	136
8	520	221	156	18	396	195	142	28	271	166	138
9	509	215	154	19	382	198	140	29	243	161	136
10	491	207	149	20	368	192	140	30	249	158	138
								31	249	151	.....

NOTE.—Discharge estimated July 1 and 2.

Monthly discharge of Fish Creek near Wilson, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July	690	243	429	26,400
August	246	151	199	12,200
September	156	134	144	8,570
The period	.....	.....	.....	47,200

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MOSQUITO CREEK NEAR WILSON, WYO.

LOCATION.—About sec. 15, T. 40 N., R. 117 W., near mouth of creek and 5 miles south of Wilson, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 20, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Reference point on left bank, at same location as vertical staff used during 1917; read when station was visited by engineer.

DISCHARGE MEASUREMENTS.—Made by wading above gage.

CHANNEL AND CONTROL.—Bed composed of small boulders. Control formed by riffle just below gage; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and for period of record, 3.55 feet June 6 (discharge, 308 second-feet); minimum stage, 0.81 foot September 17 (discharge, 8 second-feet). A lower discharge may have occurred on a day of no record.

ICE.—Records discontinued during winter.

DIVERSIONS.—Small diversion above during irrigation season.

REGULATION.—None except that due to diversion.

ACCURACY.—Stage-discharge relation not permanent. Rating curve well defined. Gage read only occasionally by engineer. Daily discharge ascertained by applying daily gage height to rating table; shifting-control method used July 4–14; interpolated for days of no gage height. Records fair.

Discharge measurements of Mosquito Creek near Wilson, Wyo., during the year ending Sept. 30, 1918.

[Made by T. R. Newell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 6	3.55	308	Aug. 1	1.02	17.7	Sept. 4	0.86	9.9
July 3	1.54	66.7	18	.95	14.1	17	.81	8.7
15	1.30	35.6						

Daily discharge, in second-feet, of Mosquito Creek near Wilson, Wyo., for the year ending Sept. 30, 1918.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	78	18	11	11	43	17	9	21	30	13	9
2	72	17	11	12	42	17	9	22	29	13	9
3	67	17	11	13	40	17	9	23	28	13	9
4	62	17	10	14	38	17	9	24	26	12	10
5	59	17	10	15	36	17	9	25	25	12	10
6	56	17	10	16	35	17	9	26	24	12	10
7	52	17	10	17	34	16	8	27	23	12	10
8	49	17	10	18	33	14	9	28	22	12	10
9	47	17	9	19	32	13	9	29	21	12	10
10	45	17	9	20	31	13	9	30	20	11	11
								31	19	11	.....

NOTE.—Discharge estimated July 1 and 2. Discharge interpolated July 6, 7, 9–14, 16–31, Aug. 2–16, 19–31, Sept. 1–3, 5, 6, 9–16, and 18–29.

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Monthly discharge of Mosquito Creek near Wilson, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July	78	19	39.3	2,420
August	18	11	14.9	916
September	11	9	9.60	571
The period				3,910

BIG SPRING CREEK NEAR CHENEY, WYO.

LOCATION.—In sec. 24, T. 40 N., R. 117 W., 1 mile above mouth of creek and 2 miles west of Cheney post office, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 16, 1917, to September 30, 1918, when station was discontinued. Discharge measurements only, prior to June 18, 1918.

GAGE.—Vertical staff on left bank, at same site and datum as reference point used during 1917; read by Mrs. F. C. Karns.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of gravel; shifting. Control seriously affected by growth of moss.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.30 feet June 25 (discharge, 108 second-feet); minimum stage, 1.96 feet August 2 (measured discharge, 32 second-feet).

ICE.—No record.

DIVERSIONS.—Several small diversions above, during irrigation season.

REGULATION.—Flow regulated by springs and waste water from irrigation above.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table and interpolating for days of no gage height. Shifting-control method used June 19 to July 4. Records fair to July 5, good thereafter.

Discharge measurements of Big Spring Creek near Cheney, Wyo., during the year ending Sept. 30, 1918.

[Made by T. R. Newell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 18	1.94	41.0	Aug. 4	2.04	42.4	Sept. 5	2.07	50.6
July 6	2.00	35.9	20	2.12	57.0	18	2.05	43.3
Aug. 2	1.96	31.6						

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Daily discharge, in second-feet, of Big Spring Creek near Cheney, Wyo., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	.....	39	37	51	16	.....	58	37	52
2	.....	39	33	47	17	.....	64	37	52
3	.....	37	37	49	18	42	54	37	46
4	.....	37	40	49	19	42	54	54	46
5	.....	37	37	49	20	47	54	56	46
6	.....	37	37	47	21	49	46	54	46
7	.....	37	37	47	22	68	46	54	49
8	.....	37	37	54	23	76	46	54	49
9	.....	37	37	54	24	92	46	54	49
10	.....	37	37	54	25	108	51	54	49
11	.....	37	37	54	26	96	54	54	46
12	.....	37	37	54	27	83	37	54	45
13	.....	46	37	54	28	62	37	54	45
14	.....	54	37	54	29	42	37	54	44
15	.....	54	37	52	30	42	37	46	44
					31	.....	37	46	.....

NOTE.—Discharge interpolated Sept. 27 and 28.

Monthly discharge of Big Spring Creek near Cheney, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 18-30	108	42	65.3	1,680
July	64	37	43.9	2,700
August	56	33	43.6	2,680
September	54	44	49.2	2,930
The period				9,990

FLAT CREEK NEAR CHENEY, WYO.

LOCATION.—In NE. ¼ sec. 29, T. 40 N., R. 116 W., 2 miles above mouth of creek and 1 mile south of Cheney post office, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 7, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on left bank; read by B. W. Clevenger and Elsie Tanner.

DISCHARGE MEASUREMENTS.—Made by wading above gage.

CHANNEL AND CONTROL.—Bed composed of gravel; practically permanent. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and for period of record, 1.78 feet at 8 a. m. June 24 (discharge, 420 second-feet); minimum stage, 0.70 foot September 5, 6, and 12 (discharge, 101 second-feet).

ICE.—Records discontinued during winter.

DIVERSIONS.—No diversions immediately above or below gage, but valley above is irrigated by numerous canals; amount diverted not known.

REGULATION.—None except that due to diversions.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table and interpolating for days of no gage height. Records good.

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Discharge measurements of Flat Creek near Cheney, Wyo., during the year ending Sept. 30, 1918.

[Made by T. R. Newell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 18	1.45	316	Aug. 3	0.79	129	Sept. 5	0.70	102
July 7	1.02	188	16	.91	150	19	.72	103
16	.92	163	20	.78	121	29	.74	112

Daily discharge, in second-feet, of Flat Creek near Cheney, Wyo., for the year ending Sept. 30, 1918,

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		261	130	130	16		160	162	130
2		243	124	124	17		160	160	127
3		202	124	119	18	316	154	157	124
4		188	132	106	19	337	157	157	106
5		185	132	101	20	343	146	122	106
6		188	132	101	21	353	157	124	109
7		188	132	104	22	368	162	130	106
8		174	132	106	23	416	160	132	130
9		165	146	104	24	420	157	146	132
10		160	154	104	25	384	154	154	132
11		149	165	104	26	381	157	151	130
12		146	174	101	27	306	160	146	106
13		151	174	104	28	316	151	151	106
14		174	174	106	29	291	157	149	109
15		165	165	130	30	282	143	132	106
					31		137	138	

NOTE.—Discharge interpolated Aug. 1, 5-7, and 17.

Monthly discharge of Flat Creek near Cheney, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 18-30	420	282	347	8,950
July	261	137	168	10,300
August	174	122	145	8,920
September	132	101	113	6,720
The period				34,900

HORSE CREEK NEAR CHENEY, WYO.

LOCATION.—In NW. ¼ SE. ¼ sec. 14, T. 39 N., R. 116 W., 300 feet above bridge on road from Hoback to Jackson, a quarter of a mile above mouth, and 6 miles southeast of Cheney post office, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 8 to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on right bank at same location and at a datum 1.14 feet higher than reference point used in 1917; read when station was visited by engineer.

DISCHARGE MEASUREMENTS.—Made by wading above gage.

CHANNEL AND CONTROL.—Control for low stage composed of loose gravel; for high stages control formed by old log dam, short distance below; slightly shifting.

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EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.95 feet July 20 (discharge, 39 second-feet); minimum stage, 1.15 feet September 21 (discharge, 11 second-feet). A lower discharge may have occurred on a day of no record.

1917–1918: Maximum stage recorded, 3.76 feet July 8, 1917 (discharge, 139 second-feet); minimum stage in 1918.

ICE.—Records discontinued during winter.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined. Gage read only occasionally by engineer. Daily discharge ascertained by applying daily gage height to rating table and interpolating for days of no gage height. Records fair.

Discharge measurements of Horse Creek near Cheney, Wyo., during the year ending Sept. 30, 1918.

[Made by C. W. Kief.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
July 20	1.95	39.1	Aug. 14	1.60	19.3	Sept. 11	1.42	13.7
28	1.73	29.4	31	1.45	15.4	21	1.15	11.4

Daily discharge, in second-feet, of Horse Creek near Cheney, Wyo., for the year ending Sept. 30, 1918.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1		27	15	11		21	14	21	38	19	11
2		26	15	12		20	13	22	36	18	11
3		25	15	13		20	13	23	35	18	11
4		25	15	14		19	13	24	34	18	11
5		24	15	15		19	13	25	33	17	11
6		24	14	16		19	12	26	32	17	11
7		23	14	17		19	12	27	30	17	11
8		23	14	18		19	12	28	29	16	11
9		22	14	19		19	12	29	28	16	11
10		21	14	20	39	19	12	30	28	16	11
								31	27	15	

NOTE.—Used actual measurements, July 20, 28, Aug. 14, 31, Sept. 11, and 21. Discharge estimated Sept. 22–30. Discharge interpolated July 21–27, 29–31, Aug. 1–13, 15–20, 22–30, Sept. 1–10, and 12–20.

Monthly discharge of Horse Creek near Cheney, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July 20–31	39	27	32.4	771
August	27	15	20.0	1,230
September	15	11	12.7	756
The period				2,760

HOBACK RIVER NEAR CHENEY, WYO.

LOCATION.—In NW. ¼ NW. ¼ sec. 26, T. 39 N., R. 116 W., a quarter of a mile above mouth and 8 miles southeast of Cheney post office, Lincoln County.

DRAINAGE AREA.—572 square miles.

RECORDS AVAILABLE.—July 9, 1917, to September 30, 1918, when station was discontinued.

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GAGE.—Vertical staff in three sections on right bank; read by Jim C. Imeson.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 700 feet below gage.

CHANNEL AND CONTROL.—Bed composed of large boulders. Control formed by series of rapids just below gage; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and for period of record, 13.46 feet at 9.10 a. m. June 16 (discharge, 6,160 second-feet); minimum stage, 5.5 feet on numerous days during September (discharge, 326 second-feet).

ICE.—Records discontinued during winter.

DIVERSIONS.—Practically none.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during season. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair prior to July 19 and good for remainder of year.

Discharge measurements of Hoback River near Cheney, Wyo., during the year ending Sept. 30, 1918.

[Made by C. W. Kief.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 22	11.48	4,580	Aug. 14	5.85	490	Sept. 21	5.49	335
July 20	7.07	1,280	31	5.64	375			
28	6.36	859	Sept. 11	5.60	369			

Daily discharge, in second-feet, of Hoback River near Cheney, Wyo., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		2,230	718	350	16	6,120	1,590	506	350
2		2,160	718	398	17	5,960	1,450	506	326
3		2,230	655	398	18	5,800	1,380	506	326
4		2,160	655	373	19	5,560	1,310	506	326
5		2,090	624	373	20	5,320	1,250	506	326
6		2,020	594	350	21	5,160	1,310	535	326
7		1,940	564	326	22	4,530	1,310	506	326
8		1,800	535	326	23	4,600	1,110	492	326
9		1,730	535	326	24	4,370	1,040	479	350
10		1,730	535	326	25	4,060	782	465	326
11		1,660	535	373	26	3,820	750	451	326
12		1,660	535	326	27	3,280	815	438	326
13		1,590	506	326	28	2,900	880	424	326
14	5,960	2,020	506	326	29	2,530	782	398	326
15	5,720	1,800	506	326	30	2,380	782	398	326
					31		750	398	

NOTE.—Discharge interpolated July 27 and Aug. 23-27.

Monthly discharge of Hoback River near Cheney, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 14-30	6,120	2,380	4,590	155,000
July	2,230	750	1,490	91,600
August	718	398	524	32,200
September	398	326	339	20,200
The period				299,000

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FALL CREEK NEAR CHENEY, WYO.

LOCATION.—About sec. 22, T. 39 N., R. 116 W. (unsurveyed), a short distance above mouth of creek and 8 miles south of Cheney, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 19, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on right bank, 40 feet upstream from bridge at Sewell ranch; read by W. H. Sewell.

DISCHARGE MEASUREMENTS.—Made by wading below gage.

CHANNEL AND CONTROL.—Bed composed of hardpan; permanent. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and for period of record, 3.80 feet June 15 (discharge, 440 second-feet); minimum stage, 1.46 feet September 28–30 (discharge, 28 second-feet).

ICE.—Records discontinued during winter.

DIVERSIONS.—Small diversion above gage during irrigation season.

REGULATION.—None except that caused by diversions during irrigation season.

ACCURACY.—Stage-discharge relation practically permanent during season. Rating curve fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Fall Creek near Cheney, Wyo., during the year ending Sept. 30, 1918.

[Made by C. W. Kief.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
July 7	2.00	109	July 30	1.67	56.5	Sept. 2	1.54	35.7
21	1.79	68.5	Aug. 15	1.60	46.1	21	1.48	29.7

Daily discharge, in second-feet, of Fall Creek near Cheney, Wyo., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		137	48	40	16	400	90	48	32
2		132	46	37	17	410	87	45	31
3		126	52	37	18	396	82	45	31
4		123	52	35	19	380	79	45	31
5		106	49	35	20	384	74	44	30
6		114	45	35	21	370	74	45	30
7		106	45	33	22	314	71	45	30
7		103	45	33	23	323	66	45	32
9		98	45	33	24	294	62	45	31
10		96	45	32	25	256	62	45	30
11		90	45	32	26	207	59	45	29
12	372	90	45	32	27	193	59	45	29
13	410	90	45	32	28	171	58	45	28
14	416	106	45	32	29	148	56	45	28
15	440	90	45	32	30	143	53	45	28
					31		52	42	

NOTE.—Discharge interpolated June 30 and July 1.

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Monthly discharge of Fall Creek near Cheney, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 12-30	440	143	317	11,900
July	137	52	86.8	5,340
August	52	42	45.7	2,810
September	40	28	32.0	1,900
The period				22,000

DOG CREEK NEAR CHENEY, WYO.

LOCATION.—About sec. 15, T. 38 N., R. 116 W. (unsurveyed), half a mile from mouth and 11 miles south of Cheney post office, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 18, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on right bank; read when station was visited by engineer.

DISCHARGE MEASUREMENTS.—Made by wading above gage.

CHANNEL AND CONTROL.—Bed composed of gravel. Control formed by large boulders; somewhat shifting.

EXTREMES OF DISCHARGE.—Data too few.

ICE.—Records discontinued during winter.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined. Gage read only occasionally by engineer. Daily discharge ascertained by applying daily gage height to rating table; interpolated for days of no gage height. Records poor.

Discharge measurements of Dog Creek near Cheney, Wyo., during the year ending Sept. 30, 1918.

[Made by C. W. Kief.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
July 6	1.58	28.5	July 31	1.30	11.6	Sept. 15	1.21	6.6
22	1.38	12.7	Aug. 16	1.28	9.3			

Daily discharge, in second-feet, of Dog Creek near Cheney, Wyo., for the year ending Sept. 30, 1918.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	31	10.0	8.3	11	22	9.6	7.6	21	13	9.0	7.2
2	30	10.0	8.2	12	21	9.6	7.6	22	13	9.0	7.2
3	29	9.9	8.2	13	20	9.5	7.5	23	13	8.9	7.2
4	28	9.9	8.1	14	19	9.5	7.4	24	13	8.8	7.2
5	27	9.9	8.0	15	19	9.4	7.4	25	12	8.8	7.1
6	26	9.8	8.0	16	18	9.4	7.4	26	12	8.7	7.1
7	26	9.8	7.9	17	17	9.3	7.4	27	12	8.6	7.1
8	25	9.7	7.8	18	16	9.2	7.3	28	11	8.6	7.1
9	24	9.7	7.8	19	15	9.2	7.3	29	11	8.5	7.0
10	23	9.6	7.7	20	14	9.1	7.3	30	11	8.4	7.0
								31	10	8.4	.....

NOTE.—Discharge estimated July 1-5 and Sept. 16-30. Discharge interpolated July 7-21, 23-30, Aug. 1-15, 17-31, and Sept. 1-14.

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Monthly discharge of Dog Creek near Cheney, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July	31	10	18.7	1,150
August	10	8.4	9.28	571
September	8.3	7.0	7.51	447
The period				2,170

CABIN CREEK NEAR CHENEY, WYO.

LOCATION.—About sec. 27, T. 38 N., R. 116 W. (unsurveyed), near the mouth of creek and 14 miles south of Cheney post office, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 18, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on left bank: read when station was visited by engineer.

DISCHARGE MEASUREMENTS.—Made by wading above gage.

CHANNEL AND CONTROL.—Bed composed of boulders embedded in gravel drift; shifting. No well-defined control.

ICE.—Records discontinued during winter.

REGULATION.—None.

ACCURACY.—Stage-discharge relation shifting during high water. Gage read only when visited by engineer. Daily discharge ascertained by using actual measurements and interpolating for days of no gage height. Records poor.

Discharge measurements of Cabin Creek near Cheney, Wyo., during the year ending Sept. 30, 1918.

[Made by C. W. Kief.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 15	1.47	66.4	July 22	0.81	5.3	Sept. 3	0.60	2.0
July 10	.91	9.2	31	.71	4.1			

Daily discharge, in second-feet, of Cabin Creek near Cheney, Wyo., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		22	3	3	16	64	7	3	2
2		20	3	3	17	62	7	3	2
3		18	3	2	18	59	6	3	2
4		16	3	2	19	56	6	3	2
5		14	3	2	20	53	6	3	2
6		13	3	2	21	50	6	3	2
7		12	3	2	22	47	5	3	2
8		11	3	2	23	44	5	3	3
9		10	3	2	24	41	5	3	2
10		9	3	2	25	38	5	3	2
11		8	3	2	26	35	5	3	2
12		8	3	2	27	32	4	3	2
13		8	3	2	28	29	4	3	2
14		7	3	2	29	26	4	3	2
15	66	7	3	2	30	24	4	3	2
					31		4	3	

NOTE.—Used actual measurements June 15, July 10, 22, 31, and Sept. 3. Discharge estimated June 16 to July 9, and Sept. 4-30; interpolated July 11-21, 23-30, Aug. 1 to Sept. 2.

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Monthly discharge of Cabin Creek near Cheney, Wyo., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 15-30	66	24	45.4	1,440
July	22	4	8.58	528
August	3	3	3.00	184
September	3	2	2.07	123
The period				2,280

BAILEY CREEK NEAR ALPINE, IDAHO.

LOCATION.—About sec. 33, T. 38 N., R. 116 W. (unsurveyed), half a mile above mouth and 14 miles above Alpine, in Lincoln County, Wyo.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 11, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on right bank. Stevens water-stage recorder at same site and datum used during 1917; inspected by engineer when station was visited.

DISCHARGE MEASUREMENTS.—Made by wading near mouth of stream.

CHANNEL AND CONTROL.—Control of rock just below gage; shifting at intervals. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Data too few.

ICE.—Records discontinued during winter.

DIVERSIONS.—None.

REGULATION.—Stream is outlet for Bailey Lake, which is spring fed; flow very uniform.

ACCURACY.—Stage-discharge relation shifted during later part of year. Rating curve fairly well defined. Gage read only occasionally by engineer. Daily discharge ascertained by applying daily gage height to rating table and interpolating for days of no gage height. Records fair.

Discharge measurements of Bailey Creek near Alpine, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	T. R. Newell	2.77	23.2	Aug. 13	C. W. Kief	2.83	24.1
June 21	C. W. Kief	3.00	31.7	30	do	2.80	22.8
July 19	do	2.90	26.6	Sept. 19	do	2.80	20.9

Daily discharge, in second-feet, of Bailey Creek near Alpine, Idaho, for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		30	25	22	16		28	24	22
2		30	25	22	17		28	24	22
3		30	25	22	18		28	24	22
4		30	25	22	19		27	24	21
5		30	25	22	20		27	24	21
6		29	25	22	21	32	27	24	21
7		29	25	22	22	31	27	23	21
8		29	25	22	23	31	26	23	21
9		29	25	22	24	31	26	23	21
10		29	25	22	25	31	26	23	21
11		29	25	22	26	31	26	23	21
12		28	25	22	27	31	26	23	21
13		28	24	22	28	31	25	23	21
14		28	24	22	29	30	25	23	21
15		28	24	22	30	30	25	23	21
					31		25	22	

NOTE.—Actual measurement used Sept. 19. Discharge estimated Sept. 20-30; interpolated, June 22-July 18, 20-26, 28-31, Aug. 1-12, 14-29, 31, and Sept. 1-18.

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Monthly discharge of Bailey Creek near Alpine, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 21-30	32	30	30.9	613
July	30	25	27.7	1,700
August	25	22	24.0	1,480
September	22	21	21.6	1,290
The period				5,080

WOLF CREEK NEAR ALPINE, IDAHO.

LOCATION.—About sec. 4, T. 37 N., R. 117 W. (unsurveyed), 400 feet above mouth of creek and 9 miles east of Alpine, in Lincoln County, Wyo. Wolf Creek enters Snake River 8 miles above mouth of Snake River canyon.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 17, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Lietz water-stage recorder on right bank referred to outside vertical staff; moved 300 feet downstream July 14, 1918; inspected by engineer.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge below gage.

CHANNEL AND CONTROL.—Bed composed of boulders. Control formed by rocky riffle just below gage; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 1.70 feet at 11 p. m. July 14 (discharge, 48 second-feet); minimum stage, 1.27 feet September 26-28 (discharge, 11 second-feet).

1917-1918: Maximum stage recorded, 2.52 feet at 4 p. m. July 18, 1917 (discharge, about 70 second-feet); minimum stage in 1918.

ICE.—Records discontinued during winter.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Two fairly well defined rating curves used, one July 14 to August 16, the other August 26 to September 28. Shifting-control method used August 17-25. Operation of water-stage recorder not entirely satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph and interpolating for days of no gage height. Records fair.

Discharge measurements of Wolf Creek near Alpine, Idaho, during the year ending Sept. 30, 1918.

[Made by C. W. Kief.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
July 14	1.60	33.9	Aug. 16	1.43	17.3	Sept. 28	1.28	10.5
22	1.50	27.5	Sept. 3	1.33	14.9			
31	1.46	21.4	22	1.29	12.2			

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Daily discharge, in second feet, of Wolf Creek near Alpine, Idaho, for the year ending Sept. 30, 1918.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1		21	16	11		18	14	21	27	16	12
2		20	16	12		18	13	22	26	16	12
3		20	16	13		18	13	23	25	16	12
4		20	15	14	36	17	13	24	25	17	12
5		19	15	15	36	17	12	25	24	17	12
6		19	15	16	34	17	12	26	24	17	11
7		19	14	17	32	17	12	27	23	17	11
8		19	14	18	32	16	12	28	23	17	11
9		19	15	19	30	16	12	29	22	16	11
10		18	14	20	29	16	12	30	22	16	11
								31	21	16	

NOTE.—Discharge interpolated July 23–30, Aug. 4–15, 31, Sept. 1, 2, 11–14. Discharge estimated Sept. 29 and 30.

Monthly discharge of Wolf Creek near Alpine, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July 14–31	36	21	27.3	975
August	21	16	17.6	1,080
September	16	11	13.0	774
The period				2,830

GREYS RIVER NEAR ALPINE, IDAHO.

LOCATION.—About sec. 26, T. 37 N., R. 119 W. (unsurveyed), 1¾ miles above mouth of stream and 3 miles southeast of Alpine.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 6, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff in two sections on left bank; read by Mrs. Alice Gillis.

DISCHARGE MEASUREMENTS.—Made from cable 200 feet below gage.

CHANNEL AND CONTROL.—Bed composed of loose rock and boulders. Control formed by large boulders in riffle 500 feet below gage; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and for period of record, 4.85 feet June 14 (discharge, 5,200 second-feet); minimum stage, 0.52 foot September 29 and 30 (discharge, 358 second-feet).

ICE.—Records discontinued during winter.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation apparently permanent. Rating curve well defined. Gage read once daily to tenths or half-tenths prior to August 1 according to the stage and thereafter read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Greys River near Alpine, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 4	G. C. Baldwin	2.76	2,360	Aug. 19	C. W. Kief	0.79	582
July 3	C. W. Kief	2.12	1,600	28	do	.71	481
17	do	1.44	1,010	Sept. 7	do	.65	428
26	do	1.14	799	16	do	.61	398
Aug. 2	do	.99	687	29	do	.52	367
10	do	.88	638				

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Daily discharge, in second-feet, of Greys River near Alpine, Idaho, for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		1,690	680	466	16	4,980	1,060	568	414
2		1,690	652	454	17	4,980	1,020	588	402
3		1,590	637	454	18	4,830	980	568	396
4	2,360	1,400	637	454	19	4,530	980	540	389
5	2,360		637	454	20	4,830	1,020	547	377
6	2,990		637	447	21	3,530	980	533	371
7	3,120		602	440	22	3,250	902	533	371
8	3,390	1,240	602	447	23	3,530	902	520	389
9	3,670		602	447	24	2,990	864	520	396
10	3,810		595	440	25	2,860	864	513	389
11	4,680		568	440	26	2,600	789	506	377
12	4,980	1,310	568	434	27	2,240	864	500	371
13	5,130	1,140	568	434	28	2,010	789	480	371
14	5,130	1,220	568	421	29	1,900	752	480	358
15	5,130	1,140	533	402	30	1,690	715	466	358
					31		680	466	

NOTE.—Discharge estimated July 5–11. Braced figure shows mean discharge for period indicated.

Monthly discharge of Greys River near Alpine, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 4–30	5,130	1,690	3,610	193,000
July	1,690	680	1,100	67,600
August	680	466	562	34,600
September	466	358	412	24,500
The period				320,000

SALT RIVER NEAR ALPINE, IDAHO.

LOCATION.—About sec. 4, T. 36 N., R. 119 W. (unsurveyed), 3 miles south of State line bridge at Alpine.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 1, 1917, to September 30, 1918, when station was discontinued. Miscellaneous measurements during 1916.

GAGE.—Vertical staff on right bank, installed June 5, 1918, at same site but at a datum 1.33 feet lower than inclined staff used previously; read by Glidden McNeel.

DISCHARGE MEASUREMENTS.—Made from cable below gage.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and boulders. Control formed by riffle 100 feet below gage; practically permanent during season.

EXTREMES OF DISCHARGE.— Maximum stage recorded during year and for period of record, 2.80 feet June 17 and 18 (discharge, 2,380 second-feet); minimum stage, 0.70 foot September 19–23 and 27–29 (discharge, 609 second-feet).

ICE.—Records discontinued during winter.

DIVERSIONS.—Considerable water diverted above gage for irrigation in Salt River valley; amount not determined. No diversions below gage.

REGULATION.—None, except that due to diversions.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

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Discharge measurements of Salt River near Alpine, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 4	T. R. Newell	2.29	817	Aug. 9	C. W. Kief	1.02	865
June 5	Kief and Baldwin	2.22	1,950	10	G. C. Baldwin	1.04	831
26	C. W. Kief	2.09	1,670	27	C. W. Kief	.87	764
July 12	do	1.44	1,160	Sept. 7	do	.78	659
24	do	1.27	1,090	17	do	.75	633
Aug. 3	do	1.03	897	29	do	.71	642

Daily discharge, in second-feet, of Salt River near Alpine, Idaho, for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		1,240	876	722	16	2,290	1,320	876	684
2		1,240	876	722	17	2,380	1,320	837	646
3		1,160	876	684	18	2,380	1,160	876	646
4		1,160	837	722	19	2,290	1,110	876	609
5	1,840	1,110	837	684	20	2,200	1,110	837	609
6	1,840	1,070	837	684	21	2,110	1,110	760	609
7	1,930	1,110	876	684	22	2,110	1,110	760	609
8	1,930	1,070	837	722	23	2,110	1,070	760	609
9	1,930	1,070	837	722	24	2,110	1,070	760	646
10	2,020	1,030	876	722	25	2,110	1,030	760	684
11	1,930	1,030	837	722	26	1,750	1,070	760	646
12	1,930	1,200	837	684	27	1,580	1,030	722	609
13	1,930	1,030	837	684	28	1,400	994	722	609
14	1,930	1,240	837	646	29	1,400	954	722	609
15	2,020	1,240	915	646	30	1,240	954	722	646
					31		915	722	

Monthly discharge of Salt River near Alpine, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 5-30	2,380	1,240	1,950	101,000
July	1,320	915	1,110	68,200
August	915	722	816	50,200
September	722	609	664	39,500
The period				259,000

McCOY CREEK NEAR ALPINE, IDAHO.

LOCATION.—In sec. 6, T. 3 S., R. 46 E., half a mile from mouth of creek and 3 miles west of Alpine post office, Bonneville County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 15, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Lietz water-stage recorder on right bank, installed June 25, 1918, and referred to vertical staff used during 1917; inspected by engineer when station was visited.

DISCHARGE MEASUREMENTS.—Made by wading above gage.

CHANNEL AND CONTROL.—Bed composed of clean, coarse gravel and boulders, shifting at intervals. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year and for period of record, from water-stage recorder, 3.67 feet at 3 p. m. June 25 (discharge, 190 second-feet); minimum stage, 2.81 feet September 22 (discharge, 17 second-feet).

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ICE.—Records discontinued during winter.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined. Operation of recorder fairly satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table. Shifting-control method used July 3–10, August 5–10, and August 28 to September 5. Records fair.

Discharge measurements of McCoy Creek near Alpine, Idaho, during the year ending Sept. 30, 1918.

[Made by C. W. Kief.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
July 2	3.45	137	Aug. 3	3.64	37.9	Sept. 6	2.85	22.0
11	3.30	89.3	11	2.97	29.1	17	2.84	20.5
25	3.14	58.1	26	2.88	20.6			

Daily dischar . . second-feet, of McCoy Creek near Alpine, Idaho, for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		145	44	21	16		84	40	20
2		135	41	21	17		80	44	19
3		133	38	21	18		86	38	18
4		133	38	22	19		73	36	18
5		121	38	22	20		71	34	18
6		119	35	22	21		69	32	18
7		114	35	21	22		65	30	17
8		108	33	21	23		63	27	18
9		102	33	23	24		61	25	19
10		96	31	21	25	190	57	23	22
11		90	30	21	26	183	55	21	20
12		88	30	21	27	176	53	21	18
13		86	30	21	28	171	49	21	18
14		112	30	20	29	166	47	21	18
15		92	51	20	30	154	45	19	17
					31		44	21	

NOTE.—Discharge interpolated Aug. 19–25, Sept. 14–16; estimated Sept. 26–30.

Monthly discharge of McCoy Creek near Alpine, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 25–30	190	154	173	2,060
July	145	44	86.3	5,310
August	51	19	31.9	1,960
September	23	17	19.9	1,180
The period				10,500

INDIAN CREEK NEAR BLOWOUT, IDAHO.

LOCATION.—In SE. ¼ sec. 13, T. 2 S., R. 45 E., 150 yards above mouth, three-quarters of a mile below Alpine Hot Springs, and 6 miles northwest of Alpine, Bonneville County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 14, 1917, to September 21, 1918, when station was discontinued.

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GAGE.—Vertical staff on left bank 100 yards below bridge, used until June 15 when it was washed out by high water. Vertical staff installed 600 feet above former gage on left bank, July 10, 1918, and used for remainder of season; read by Mrs. Emma Marks. Relation between gages not determined.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; shifting. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year and for period of record, 3.55 feet at 7.15 p. m. June 14 (discharge, 350 second-feet); minimum stage, 0.76 foot at 7.30 a. m. September 21 (discharge, 0.4 second-foot).

ICE.—Records discontinued during winter.

DIVERSIONS.—Small diversions above, none below.

REGULATION.—None other than that caused by diversion.

ACCURACY.—Stage-discharge relation not permanent. Two rating curves used; one fairly well defined used June 4 to 15; the other, well defined, used July 28 to September 21. Records fragmentary, gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Discharge measurements of Indian Creek near Blowout, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 4	Kief and Howard	1.98	85.4	Aug. 10	G. C. Baldwin	0.93	1.7
July 10	E. C. Howard	1.66	45.1	23	E. C. Howard	.90	1.3
26	do	1.55	22.6	Sept. 7	do	.88	1.1
Aug. 10	do	.94	1.8	21	do	.76	.4

Daily discharge, in second-feet, of Indian Creek near Blowout, Idaho, for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1			7.5	1.1	16		37	1.1	0.8
2			4.5	1.2	17		35	1.2	.7
3			2.6	1.1	18		34	1.3	.7
4	86		1.3	1.1	19		33	1.3	.6
5	88		2.0	1.1	20		31	1.2	.5
6	103		1.7	1.1	21		30	1.2	.4
7	117		1.6	1.1	22		28	1.2	
8	163		1.7	1.1	23		27	1.3	
9	248		1.3	1.1	24		26	1.3	
10	284	45	1.7	1.1	25		24	1.1	
11	322	44	1.3	1.1	26		23	1.2	
12	341	42	1.2	1.1	27		20	1.2	
13	322	41	1.3	1.0	28		17	1.3	
14	350	40	1.3	1.0	29		13	1.1	
15	341	38	1.2	.9	30		12	1.1	
					31		11	1.1	

NOTE.—Actual measurements used July 10 and 26. Discharge interpolated July 11-25, 27, and Sept. 15-20.

Monthly discharge of Indian Creek near Blowout, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 4-15	350	86	230	5,470
July 10-31	45	11	29.6	1,290
August	7.5	1.1	1.66	102
September 1-21	1.2	.4	.95	40

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BIG ELK CREEK NEAR BLOWOUT, IDAHO.

LOCATION.—In sec. 23, T. 1 S., R. 45 E., 100 yards above mouth of creek and 5 miles northwest of Blowout, Bonneville County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 15, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on right bank; read by Oliver Jacobson.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge.

CHANNEL AND CONTROL.—Bed composed of clean, coarse gravel and boulders. Control formed by riffle of gravel and boulders; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and for period of record, 4.35 feet June 15 (discharge, 870 second-feet); minimum stage, 1.0 foot September 27 and 28 (discharge, 58 second-feet).

ICE.—Records discontinued during winter.

DIVERSIONS.—Small diversions above during irrigation season.

REGULATION.—None except that due to diversions.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Big Elk Creek near Blowout, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 6	Baldwin and Howard	3.27	540	Aug. 22	E. C. Howard	1.34	85.9
July 10	E. C. Howard	1.98	200	22	do	1.34	88.4
25	do	1.59	127	Sept. 6	do	1.11	64.8
Aug. 9	do	1.28	83.8	21	do	1.04	63.4

Daily discharge, in second-feet, of Big Elk Creek near Blowout, Idaho, for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	.....	283	87	70	16	756	194	80	62
2	.....	295	91	70	17	788	194	83	62
3	345	283	95	70	18	772	201	85	62
4	453	226	97	70	19	708	151	83	62
5	510	237	91	70	20	740	145	83	62
6	533	233	85	68	21	661	145	80	62
7	614	226	83	65	22	655	136	85	62
8	614	226	83	65	23	646	124	74	62
9	692	216	81	65	24	554	124	74	59
10	692	197	80	65	25	524	127	72	59
11	788	194	80	65	26	481	124	72	59
12	756	184	80	64	27	439	119	72	58
13	853	184	80	64	28	384	114	72	58
14	836	174	80	64	29	308	111	72	58
15	870	174	80	64	30	308	97	72	58
					31	.....	91	72	.....

NOTE.—Discharge estimated Sept. 29 and 30.

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Monthly discharge of Big Elk Creek near Blowout, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 3-30	870	308	617	34,300
July	295	91	178	10,900
August	97	72	80.8	4,970
September	70	58	63.5	3,780
The period				54,000

BEAR CREEK NEAR IRWIN, IDAHO.

LOCATION.—In sec. 20, T. 1 S., R. 45 E., at wagon bridge a quarter of a mile from mouth of creek and 7 miles southeast of Irwin, Bonneville County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 23, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on right bank, at downstream side of bridge; read by Thelma E. Hill.

DISCHARGE MEASUREMENTS.—Made by wading above bridge.

CHANNEL AND CONTROL.—Bed consists of coarse gravel and boulders; shifting. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and for period of record, 4.05 feet at 5.25 p. m. June 15 (discharge, 369 second-feet); minimum stage, 1.65 feet September 27-30 (discharge, 44 second-feet).

ICE.—Records discontinued during winter.

DIVERSIONS.—Several small diversions above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Two fairly well defined rating curves used; one June 9 to July 11, the other July 25 to September 30. Shifting-control method used July 12-24. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Discharge measurements of Bear Creek near Irwin, Idaho, during the year ending Sept. 30, 1918.

[Made by E. C. Howard.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 27	2.72	179	Aug. 10	1.92	69.9	Sept. 9	1.84	65.3
July 11	2.43	154	23	1.85	64.5	22	1.74	52.4
25	2.03	83.2	23	1.85	66.6			

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Daily discharge, in second-feet, of Bear Creek near Irwin, Idaho, for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	.....	170	81	59	16	327	139	81	54
2	.....	164	75	54	17	285	131	70	54
3	.....	164	75	54	18	257	124	64	54
4	.....	164	75	54	19	229	117	75	54
5	.....	160	75	54	20	222	115	64	49
6	.....	157	75	54	21	216	114	64	49
7	.....	150	75	54	22	216	108	64	51
8	.....	150	75	59	23	209	101	64	49
9	355	150	75	61	24	202	100	64	49
10	355	150	74	59	25	202	93	64	49
11	327	149	75	54	26	190	87	64	49
12	320	149	70	54	27	188	87	64	44
13	313	148	64	54	28	190	87	64	44
14	355	153	70	54	29	176	87	59	44
15	369	147	81	54	30	170	87	54	44
					31	.....	87	54	.....

NOTE.—Discharge interpolated June 12, 16, 20, and 23.

Monthly discharge of Bear Creek near Irwin, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 9-30	369	170	258	11,300
July	170	87	129	7,930
August	81	54	69.3	4,260
September	61	44	52.3	3,110
The period	.....	.....	.....	26,600

PALISADE CREEK NEAR IRWIN, IDAHO.

LOCATION.—In sec. 26, T. 1 N., R. 44 E., 20 feet above bridge, a quarter of a mile above mouth of creek, and 3½ miles southeast of Irwin, Bonneville County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 12, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on left bank installed June 3, 1918, 20 feet above vertical staff at bridge used in 1917; read by C. A. Weeks.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading below gage.

CHANNEL AND CONTROL.—Bed composed of clean, coarse gravel; shifting during high water. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and for period of record, 5.36 feet at 6.55 p. m. June 14 (discharge, 555 second-feet); minimum stage, 2.72 feet at 10.25 p. m. August 15 (discharge, 33 second-feet).

ICE.—Records discontinued during the winter.

DIVERSIONS.—Several diversions above gage.

REGULATION.—None, except that due to diversions.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table, except June 7 to 13 for which shifting-control method was used. Records fair.

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Discharge measurements of Palisade Creek near Irwin, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 6	Howard and Baldwin	4.26	376	Aug. 9	E. C. Howard	2.82	41.1
14	E. C. Howard	5.32	547	22	do	3.02	59.1
July 9	do	3.43	133	Sept. 6	do	3.00	67.3
25	do	3.21	107	21	do	3.02	61.8

Daily discharge, in second-feet, of Palisade Creek near Irwin, Idaho, for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	.....	170	65	65	16	518	94	39	65
2	.....	162	62	68	17	440	98	43	68
3	.....	154	62	71	18	426	98	49	68
4	.....	150	62	71	19	404	94	52	68
5	.....	162	59	71	20	360	91	54	68
6	376	162	59	70	21	364	91	59	66
7	419	158	57	74	22	378	91	61	68
8	411	150	52	74	23	426	87	57	68
9	406	135	45	71	24	404	87	54	65
10	417	112	45	68	25	382	92	54	65
11	431	105	43	68	26	360	74	59	62
12	490	101	39	68	27	360	71	57	65
13	550	98	39	71	28	325	71	59	68
14	550	98	36	71	29	231	68	62	65
15	541	94	33	68	30	210	62	62	68
					31	.....	65	65	.....

NOTE.—Actual measurement used June 6.

Monthly discharge of Palisade Creek near Irwin, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 6–30	550	210	407	20,200
July	170	62	108	6,640
August	65	33	53.0	3,260
September	74	62	68.2	4,060
The period	.....	.....	.....	34,200

FALL CREEK NEAR SWAN VALLEY, IDAHO.

LOCATION.—In sec. 9, T. 1 N., R. 43 E., 1 mile above mouth of creek and 3 miles above Swan Valley, Bonneville County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 21, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on right bank; read by Joseph Jones.

DISCHARGE MEASUREMENTS.—Made by wading above gage.

CHANNEL AND CONTROL.—Bed composed of clay and gravel. Control shifts with change in growth of vegetation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and for period of record, 3.82 feet at 5 p. m. June 7 (measured discharge, 109 second-feet); minimum discharge, 16 second-feet at 6.55 p. m. September 3, at stage of 2.95 feet.

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ICE.—Records discontinued during winter.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation seriously affected by growth of vegetation. Gage read to hundredths once daily. Shifting-control method used throughout season. Records fair.

Discharge measurements of Fall Creek near Swan Valley, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 7	Howard and Baldwin	3.82	109	Aug. 11	E. C. Howard	3.50	25.7
25	E. C. Howard	3.62	72.2	24	do	3.31	23.8
July 12	do	3.74	51.7	Sept. 10	do	2.87	20.7
26	do	3.74	39.6	23	do	2.71	20.2

Daily discharge, in second-feet, of Fall Creek near Swan Valley, Idaho, for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		54	33	18	16	90	62	44	2[illegible]
2		55	34	18	17	87	59	32	20
3		57	34	16	18	85	57	30	21
4		52	34	18	19	84	52	25	21
5		53	32	18	20	82	45	25	22
6		52	32	18	21	80	42	25	21
7	109	51	30	19	22	82	41	25	20
8	108	49	31	20	23	85	40	24	20
9	105	53	30	20	24	78	39	24	20
10	103	55	30	20	25	72	40	24	2[illegible]
11	100	57	27	20	26	64	40	23	20
12	97	55	28	20	27	62	38	22	20
13	94	62	28	20	28	60	38	21	20
14	93	66	28	20	29	58	36	20	20
15	91	64	25	20	30	56	34	20	21
					31		34	19	

Monthly discharge of Fall Creek near Swan Valley, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 7-30	109	56	84.4	4,020
July	66	34	49.4	3,040
August	44	19	27.7	1,700
September	22	16	19.7	1,170
The period				9,930

RAINY CREEK AT SWAN VALLEY, IDAHO.

LOCATION.—In sec. 3, T. 1 N., R. 43 E., 150 yards above wagon bridge, a quarter of a mile east of Swan Valley, Bonneville County, and 1½ miles above mouth of creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 14, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on left bank; read by Pauline Brewer.

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DISCHARGE MEASUREMENTS.—Made from wagon bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and clay. Control affected by backwater from Snake River and by growth of aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.90 feet at 10 a. m. June 14 (discharge, 195 second-feet); miminum stage, 2.21 feet September 28 and 29 (discharge, 43 second-feet).

1917–1918: Maximum stage in 1918. Minimum stage, 1.40 feet August 23, 1917 (discharge, 36 second-feet).

ICE.—Records discontinued during winter.

DIVERSIONS.—Several diversions above gage, none below.

REGULATION.—None except that due to diversions.

ACCURACY.—Stage-discharge relation continually changing. Standard rating curve not well defined. Gage read to hundredths once daily. Daily discharge ascertained by shifting-control method. Records poor.

Discharge measurements of Rainy Creek at Swan Valley, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 3	Kiefand Baldwin	2.48	178	Aug. 11	G. C. Baldwin	2.34	53.0
14	E. C. Howard	4.30	195	21	E. C. Howard	2.43	50.1
July 8	do	1.89	56.0	Sept. 5	do	2.44	57.9
24	do	2.12	66.0	20	do	2.36	57.3
Aug. 8	do	2.28	60.3				

Daily discharge, in second-feet, of Rainy Creek at Swan Valley, Idaho, for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	.....	71	57	59	16	180	61	56	53
2	.....	71	55	61	17	172	62	58	51
3	178	69	65	62	18	165	64	57	48
4	180	68	90	57	19	157	69	55	49
5	181	65	90	60	20	150	69	55	53
6	183	64	82	61	21	142	69	53	48
7	184	62	95	65	22	109	66	56	46
8	186	57	65	64	23	176	66	57	47
9	187	56	59	65	24	155	66	55	46
10	189	60	57	64	25	136	62	56	46
11	190	61	54	63	26	104	63	54	46
12	192	64	55	58	27	87	64	58	46
13	193	61	47	53	28	77	64	56	43
14	195	57	50	55	29	74	64	55	43
15	187	61	55	54	30	74	61	58	46
					31	.....	62	62	.....

Monthly discharge of Rainy Creek at Swan Valley, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 3-30	195	74	157	8,720
July	71	56	63.8	3,920
August	95	47	60.5	3,720
September	65	43	53.7	3,200
The period				19,600

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PINE CREEK NEAR SWAN VALLEY, IDAHO.

LOCATION.—About sec. 16, T. 2 N., R. 43 E., 7 miles below Swan Valley, Bonneville County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 16, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on left bank, 150 feet above highway bridge; read by Mrs. Frank Soliday.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading below gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Control practically permanent after June 16.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and for period of record, 5.55 feet at 7.30 p. m. June 12 (discharge, 461 second-feet); minimum discharge September 29 and 30 (estimated, 13 second-feet).

ICE.—Records discontinued during winter.

DIVERSIONS.—Several diversions above gage; none below.

REGULATION.—None, except that due to diversions.

ACCURACY.—Stage-discharge relation not permanent. Two well-defined rating curves used, one June 5–12, the other June 16 to September 28. Shifting-control method used June 13–15. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Pine Creek near Swan Valley, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 7	Howard and Baldwin	5.38	441	Aug. 8	E. C. Howard	2.32	26.4
16	E. C. Howard	4.25	215	21	do	2.26	22.3
July 8	do	2.67	51.5	Sept. 5	do	2.16	14.3
24	do	2.43	34.0	20	do	2.13	12.5

Daily discharge, in second-feet, of Pine Creek near Swan Valley, Idaho, for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day	June.	July.	Aug.	Sept.
1		66	26	18	16	227	47	28	14
2		64	28	16	17	227	43	24	14
3		62	43	16	18	196	41	28	14
4		60	38	14	19	176	38	28	14
5	407	60	28	15	20	154	35	21	14
6	437	60	32	14	21	141	35	22	14
7	441	57	35	14	22	136	33	21	14
8	425	53	27	14	23	132	33	21	14
9	433	53	28	21	24	122	33	21	14
10	437	51	24	14	25	107	32	21	14
11	437	51	24	14	26	87	30	21	14
12	461	49	24	14	27	82	30	21	14
13	384	51	28	14	28	78	30	19	14
14	327	66	43	14	29	73	28	19	13
15	277	55	35	14	30	68	26	18	13
					31		26	18	

[illegible]harge estimated Sept. 29 and 30.

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Monthly discharge of Pine Creek near Swan Valley, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 5-30	431	68	249	12,800
July	66	26	45.1	2,770
August	43	18	26.3	1,620
September	21	13	14.5	863
The period				18,100

HENRYS FORK AT WARM RIVER, IDAHO.

LOCATION.—In sec. 12, T. 9 N., R. 43 E., 300 yards above mouth of Warm River and half a mile above Warm River railroad station, in Fremont County; above all main tributaries.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 3, 1910, to March 22, 1915; April 3 to September 30, 1918.

GAGE.—Vertical staff on left bank; read by Axel Anderson. No change in gage datum.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Bed of stream consists of cobbles, gravel, and sand. Stage-discharge relation at times affected by growth of moss; conditions with this exception are reasonably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.5 feet at 6 p. m. May 5 (discharge, 2,620 second-feet); minimum stage recorded, 4.10 feet at 3.30 p. m. April 3 (discharge, 900 second-feet).

1910–1915; 1918: Maximum stage recorded, 7.4 feet May 21, 1912 (discharge, 3,300 second-feet); minimum stage, 4.1 feet March 14 and 26, 1913 (discharge, 705 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice; open channel rating used. Much ice reported present in the channel at various times for short periods.

DIVERSIONS.—Practically none.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent during year. Standard rating curve well defined; several parallel curves used. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table or by shifting-control method. Records fair.

Discharge measurements of Henrys Fork at Warm River, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 4	C. F. Elford	4.62	1,240	May 23	G. C. Baldwin	5.09	1,510
5	do	4.50	1,160	July 16	do	4.81	1,270
May 3	G. C. Baldwin	5.61	1,950	Sept. 8	do	4.37	939

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Daily discharge, in second-feet, of Henrys Fork at Warm River, Idaho, for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1,720	1,510	1,210	1,100	970	16	1,510	1,790	1,560	1,250	1,000	970
2	.....	1,790	1,440	1,210	1,100	970	17	1,480	1,710	1,530	1,190	1,000	970
3	900	1,950	1,440	1,210	1,100	970	18	1,440	1,710	1,530	1,150	1,000	970
4	1,240	2,240	1,430	1,210	1,040	970	19	1,440	1,670	1,460	1,120	1,000	970
5	1,160	2,620	1,430	1,170	1,040	970	20	1,480	1,590	1,430	1,120	1,000	970
6	1,160	2,380	1,470	1,170	1,040	970	21	1,510	1,560	1,430	1,120	1,000	970
7	1,160	2,200	1,500	1,130	1,040	970	22	1,580	1,520	1,460	1,110	1,000	970
8	1,160	2,200	1,540	1,130	1,040	964	23	1,650	1,510	1,460	1,110	1,000	970
9	1,230	2,150	1,570	1,170	1,000	970	24	1,720	1,510	1,500	1,110	1,000	970
10	1,370	1,920	1,570	1,130	1,000	970	25	1,720	1,510	1,450	1,110	1,000	1,000
11	1,370	1,800	1,610	1,130	1,000	970	26	1,720	1,540	1,380	1,110	1,000	970
12	1,440	1,690	1,610	1,130	1,000	970	27	1,580	1,580	1,310	1,110	970	970
13	1,540	1,690	1,590	1,130	1,000	970	28	1,580	1,580	1,280	1,110	1,000	970
14	1,620	1,690	1,570	1,200	1,000	970	29	1,580	1,510	1,280	1,110	1,000	970
15	1,580	1,760	1,600	1,240	1,000	970	30	1,650	1,480	1,280	1,110	1,000	970
							31	.....	1,510	.....	1,110	1,000	.....

Monthly discharge of Henrys Fork at Warm River, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 3-30	1,720	900	1,450	80,500
May	2,620	1,480	1,780	109,000
June	1,610	1,280	1,470	87,500
July	1,250	1,110	1,150	70,700
August	1,100	970	1,020	62,700
September	1,000	964	971	57,800
The period	.....	.....	.....	468,000

HENRYS FORK NEAR REXBURG, IDAHO.

LOCATION.—In sec. 30, T. 6 N., R. 39 E., just below highway bridge, 1 mile below mouth of south channel of Teton River, 7 miles below mouth of main channel of Teton River, and 7 miles due west of Rexburg; below all tributaries.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 13, 1909, to September 30, 1918.

GAGE.—Friez water-stage recorder on right bank about 250 feet below bridge. Prior to April 5, 1913, vertical staff on right bank about 25 feet farther downstream. Datum of gage used prior to January 1, 1912, 0.67 foot higher than that of present gage. Observer, H. S. Sorensen.

DISCHARGE MEASUREMENTS.—Made from cable a quarter of a mile below gage, from highway bridge above, or by wading.

CHANNEL AND CONTROL.—Stream bed composed of mud, sand, and fine gravel; shifting. Except at bridge left bank is overflowed at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.96 feet at 11.30 a. m. June 25 (discharge, 7,560 second-feet); minimum stage recorded, 2.45 feet at 2 a. m. August 9 (discharge, 564 second-feet).

1909-1918: Maximum stage recorded, 8.7 feet (equivalent to 9.37 feet present datum) June 6 and 7, 1909 (discharge, 7,680 second-feet); minimum stage, 1.90 feet at 6 p. m. August 10, 1915 (discharge, 481 second-feet).

ICE.—Stage-discharge relation seriously affected by ice. Observations discontinued during winter.

DIVERSIONS.—A large percentage of the natural summer flow diverted above station.

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REGULATION.—None except that due to opening and closing of headgates of irrigation canals.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined. Several parallel curves used. Operation of water-stage recorder satisfactory. Mean daily gage height obtained by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table or by shifting-control method. Records good.

Discharge measurements of Henrys Fork near Rexburg, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 22	G. C. Baldwin	4.87	2,370	Aug. 12	G. C. Baldwin	2.48	581
June 21	do	9.34	6,820	29	do	3.54	1,110
July 13	do	5.00	2,320	Sept. 22	do	3.86	1,600
Aug. 7	C. F. Elford	2.53	574				

Daily discharge, in second-feet, of Henrys Fork near Rexburg, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1	2,140		3,180	3,700	642	1,100	16			7,370	2,730	917	1,600
2	2,140		3,630	3,050	604	1,040	17			7,250	2,630	1,050	1,620
3	2,140		3,270	2,770	592	999	18			6,890	2,540	1,130	1,610
4	2,100		2,910	2,500	576	1,020	19			6,650	2,370	1,130	1,640
5			3,270	2,240	588	1,010	20			6,770	2,120	1,160	1,880
6			3,720	2,320	584	971	21			6,770	1,860	1,190	1,740
7			4,300	2,320	580	999	22		2,400	6,770	1,640	1,220	1,660
8			4,700	2,400	576	1,060	23		2,240	7,010	1,460	1,250	1,600
9			5,220	2,400	572	1,250	24		2,240	7,370	1,280	1,220	1,630
10			5,550	2,400	580	1,400	25		2,320	7,490	1,160	1,220	1,770
11			6,100	2,400	584	1,460	26		2,400	7,230	1,070	1,220	1,800
12			6,540	2,480	576	1,410	27		2,640	6,840	993	1,160	1,770
13			7,010	2,320	588	1,480	28		2,820	6,250	839	1,100	1,700
14			7,010	2,320	637	1,540	29		2,640	5,680	776	1,100	1,660
15			7,250	2,560	780	1,570	30		2,480	4,700	716	1,070	1,700
							31		2,820		676	1,060	

NOTE.—No record Oct. 5 to May 21.

Monthly discharge of Henrys Fork near Rexburg, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-4	2,140	2,100	2,130	16,900
May 22-31	2,820	2,240	2,500	49,600
June	7,490	3,180	5,820	346,000
July	3,700	676	2,030	125,000
August	1,250	572	879	54,000
September	1,880	971	1,460	86,900

WARM RIVER AT WARM RIVER, IDAHO.

LOCATION.—In sec. 13, T. 9. N., R. 43 E. Boise meridian, at highway bridge half a mile above Warm River station on Yellowstone branch of Oregon Short Line Railroad, less than one-fourth mile above Robinson Creek, and half a mile above confluence of Warm River and Henrys Fork, in Fremont County.

DRAINAGE AREA.—About 144 square miles (measured on Forest Service maps).

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RECORDS AVAILABLE.—January 24, 1912, to March 22, 1915; April 3 to September 30, 1918.

GAGE.—Vertical staff attached to downstream side of bridge pier; read by Axel Anderson.

DISCHARGE MEASUREMENTS.—Made by wading at various sections near the gage.

CHANNEL AND CONTROL.—One channel at all stages. Bed of stream rocky. Control apparently fairly permanent. The stage-discharge relation during part of the year is somewhat affected by growth of moss.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.70 feet May 4-7 (discharge, 370 second-feet); minimum stage recorded, 1.35 feet July 5 and 6 and August 27 to September 7 (discharge, 208 second-feet.)

1912-1918: Maximum stage recorded, 2.3 feet June 2, 1912 (discharge, 900 second-feet); minimum stage, 1.3 feet February 15 and 20 and May 2, 5, and 7, 1912 (discharge, 192 second-feet).

ICE.—Stage-discharge relation is unaffected by ice and open channel ratings are applicable.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined; several parallel curves used. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table or by shifting-control method. Records good.

Discharge measurements of Warm River at Warm River, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 3	C. F. Elford	1.38	234	July 16	G. C. Baldwin	1.42	240
May 3	G. C. Baldwin	1.62	330	Sept. 8	do	1.39	223

Daily discharge, in second-feet, of Warm River at Warm River, Idaho, for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	324	274	229	229	208	16	281	298	274	242	229	234
2	.....	324	274	229	229	208	17	281	298	274	252	229	234
3	231	331	274	229	229	208	18	258	298	252	252	229	234
4	227	370	274	229	229	208	19	214	298	229	229	229	234
5	223	370	274	208	229	208	20	214	298	229	229	229	234
6	214	370	274	208	229	208	21	277	274	252	229	229	238
7	214	370	274	229	229	208	22	324	274	274	229	229	238
8	214	346	298	229	229	216	23	324	274	274	229	229	238
9	258	346	298	252	229	229	24	349	274	274	229	229	238
10	281	321	321	229	229	234	25	349	274	274	229	229	238
11	281	298	321	229	229	234	26	324	274	274	229	229	238
12	305	298	321	229	229	234	27	300	274	252	229	208	238
13	329	298	321	229	229	234	28	277	274	229	229	208	238
14	329	298	298	252	229	234	29	300	274	252	229	208	238
15	281	298	274	252	229	234	30	324	252	252	229	208	238
							31	.....	274	.....	229	208	.....

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Monthly discharge of Warm River at Warm River, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 3-30	349	214	278	15,400
May	370	252	305	18,800
June	321	229	274	16,300
July	252	208	232	14,300
August	229	208	226	13,900
September	238	208	228	13,600
The period				92,300

ROBINSON CREEK AT WARM RIVER, IDAHO.

LOCATION.—In sec. 13, T. 9 N., R. 43 E. Boise meridian, Fremont County, at Oregon Short Line Railroad bridge one-third mile above Warm River station on Yellowstone branch and 300 yards above mouth of the creek.

DRAINAGE AREA.—About 41 square miles (measured on Forest Service map).

RECORDS AVAILABLE.—January 24, 1912, to March 22, 1915; April 4 to September 30, 1918.

GAGE.—Vertical staff attached to a pile on downstream side of railroad bridge; read by Axel Anderson.

DISCHARGE MEASUREMENTS.—Made by wading or from the bridge.

CHANNEL AND CONTROL.—Control is a well-defined cobble riffle about 150 feet below the gage and is apparently practically permanent. Bed of stream composed of coarse gravel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.50 feet at 6 p. m. May 5 (discharge, 524 second-feet); minimum stage recorded, 1.75 feet at 11.15 a. m. September 8 (discharge, 82 second-feet).

1912–1915; 1918: Maximum stage recorded, 4.3 feet May 28, 1912 (discharge, 1,140 second-feet); minimum stage, 1.50 feet February 15, 1912 (discharge, 51 second-feet).

ICE.—Stage-discharge relation seriously affected by ice. Observations discontinued during winter.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Robinson Creek at Warm River, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 4	C. F. Elford	1.95	111	July 16	G. C. Baldwin	1.98	105
May 3	G. C. Baldwin	3.12	381	Sept. 8	do	1.80	82.4
23	do	2.79	284				

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Daily discharge, in second-feet, of Robinson Creek at Warm River, Idaho, for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	286	346	120	90	83	16	188	346	199	112	83	83
2	.....	330	286	112	90	83	17	167	346	210	112	83	83
3	.....	395	259	112	90	83	18	167	346	188	104	83	83
4	104	448	259	112	90	83	19	167	300	167	97	83	83
5	104	524	246	112	90	83	20	178	300	147	97	83	83
6	97	485	234	112	90	83	21	188	300	147	90	83	83
7	97	448	234	112	90	83	22	222	286	210	90	83	83
8	147	448	234	112	83	83	23	234	286	210	90	83	83
9	167	448	222	129	83	83	24	259	286	234	90	83	83
10	210	362	210	129	83	83	25	286	286	188	97	83	90
11	234	300	210	112	83	83	26	300	286	147	97	83	90
12	259	286	210	112	83	83	27	259	286	147	97	83	83
13	286	315	210	112	83	83	28	234	272	129	97	83	83
14	246	346	188	147	83	83	29	234	246	129	90	83	83
15	210	346	188	129	83	83	30	272	272	129	90	83	90
							31	.....	346	.....	90	83	.....

Monthly discharge of Robinson Creek at Warm River, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 4-30	300	97	204	10,900
May	524	246	341	21,000
June	346	129	204	12,100
July	147	90	107	6,580
August	90	83	84.6	5,200
September	90	83	83.7	4,980
The period	.....	.....	.....	60,800

FALL RIVER NEAR SQUIRREL, IDAHO.[1]

LOCATION.—In sec. 35, T. 9 N., R. 44 E., 9 miles southeast of Marysville, 4 miles northeast of Squirrel post office, 3 miles downstream from former site of Wilson's sawmill, and 1 mile below head of Marysville Land & Improvement Co.'s canal. Same location as Fremont station.

DRAINAGE AREA.—390 square miles.

RECORDS AVAILABLE.—January 1, 1904, to June 30, 1909; May 2 to September 30, 1918.

GAGE.—Vertical staff on left bank, installed January 1, 1904. Original gage established in 1902 was located about 3 miles upstream. Observer, Martin Luetjen.

DISCHARGE MEASUREMENTS.—Made from cable 200 feet below gage or by wading.

CHANNEL AND CONTROL.—Stream bed composed of boulders in gravel drift. Control formed by riffle below gage; fairly permanent. Both banks are high, clean, and not subject to overflow. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.57 feet at 5.30 p. m. June 15 (discharge, 5,380 second-feet); minimum stage recorded, 1.97 feet September 19–22 (discharge, 452 second-feet).

1904–1909; 1918: Maximum stage recorded, 6.8 feet June 6, 1909 (discharge, 7,620 second-feet); minimum stage, 1.4 feet April 5, 1905 (discharge, 168 second-feet).

[1] Records for 1904–1909 published under name "Fall River at Fremont, Idaho."

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ICE.—Stage-discharge relation sometimes affected by ice. No winter record.

DIVERSIONS.—Three irrigation canals divert above the station.

REGULATION.—None except that attributable to headgate changes on canals above station.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined for stages under 3,000 second-feet; extended for higher stages. Gage read to hundredths once daily. Daily discharges ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Fall River near Squirrel, Idaho, during the year ending Sept. 30, 1918.

[Made by G. C. Baldwin.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 6	3.44	1,900	July 15	2.46	809
22	2.98	1,310	Sept. 7	1.98	420

Daily discharge, in second-feet, of Fall River near Squirrel, Idaho, for the year ending Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	1,880	1,880	535	470	16	1,680	5,020	759	570	464
2	1,220	1,440	1,940	535	470	17	1,500	4,300	720	535	464
3	1,560	1,380	1,620	535	470	18	1,380	4,300	720	535	458
4	1,940	1,810	1,680	502	470	19	1,220	4,480	680	535	452
5	2,220	2,080	1,440	502	464	20	1,170	4,130	680	535	452
6	1,880	2,360	1,440	502	458	21	1,280	3,960	642	535	452
7	1,880	2,580	1,380	470	458	22	1,330	4,840	642	535	452
8	2,080	2,810	1,220	470	458	23	1,380	5,380	642	535	470
9	1,880	3,290	1,170	470	458	24	1,500	5,200	605	535	470
10	1,440	3,620	978	470	464	25	1,560	4,840	642	502	470
11	1,330	4,300	888	470	470	26	1,560	3,620	570	502	470
12	1,170	4,480	888	570	470	27	1,380	2,970	535	502	458
13	1,400	4,660	720	570	470	28	1,330	2,660	535	470	458
14	1,620	5,380	888	570	470	29	1,280	2,220	535	470	458
15	1,680	5,380	801	570	464	30	1,380	1,810	535	470	470
						31	1,880	.....	535	470	.....

Monthly discharge of Fall River near Squirrel, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 2-31	2,220	1,170	1,540	91,600
June	5,380	1,380	3,570	212,000
July	1,940	535	933	57,400
August	570	470	515	31,700
September	470	452	463	27,600
The period	.....	.....	.....	420,000

WILLOW CREEK NEAR RIRIE, IDAHO.

LOCATION.—In T. 3 N., R. 40 E., at Cutler ranch, 3 miles above mouth of canyon and 6 miles southeast of Ririe, Bonneville County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 23, 1916, to September 30, 1918.

GAGE.—Vertical staff on right bank. Gage used prior to May 1, 1917, was a vertical staff on right bank a quarter of a mile upstream. Observer, Pearl Cutler.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 200 feet downstream from gage.

CHANNEL AND CONTROL.—Stream bed composed of boulders in gravel drift; fairly permanent. Left bank is overflowed at high stages; both banks are brush cove re

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EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.75 feet at 6.30 p. m. April 26 (discharge, 1,500 second-feet); minimum stage recorded, 2.30 feet September 2 and 3 (discharge, 36 second-feet).

1916–1918: Maximum stage recorded, 16.3 feet May 15, 1917 (discharge, 4,200 second-feet); minimum stage, 2.53 feet January 13, 1917 (discharge, 34 second-feet).

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—No irrigation canals of any consequence above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent. Standard rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table or as indicated in footnote to daily-discharge table. Records good during open-water season.

Discharge measurements of Willow Creek near Ririe, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	William Kessler	2.80	67.7	May 20	G. C. Baldwin	5.49	584
Jan. 19	G. C. Baldwin	[a] 3.01	75.7	June 26	R. B. Kilgore	3.97	236
Mar. 5	C. F. Elford	2.99	114	Sept. 9	G. C. Baldwin	2.41	42.4
Apr. 10	do	4.43	339				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Willow Creek near Ririe, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	68	75	81	75	.....	217	1,100	636	165	60	37
2	68	66	88	88	.....	226	1,060	574	161	62	36
3	68	73	.....	66	.....	197	1,030	490	157	60	36
4	68	72	.....	70	.....	170	1,030	468	150	59	36
5	68	72	.....	81	86	150	1,030	445	142	57	37
6	68	70	.....	70	66	142	1,030	422	142	60	37
7	68	70	.....	60	66	134	972	400	134	56	39
8	68	70	.....	.....	88	173	914	378	127	53	39
9	68	69	.....	.....	82	190	886	378	127	52	41
10	68	68	.....	.....	77	302	886	346	134	52	42
11	68	63	.....	.....	93	336	832	336	127	48	43
12	68	63	.....	.....	92	346	778	325	124	47	40
13	68	66	.....	.....	90	444	700	314	121	46	40
14	68	70	.....	.....	88	562	674	284	157	62	40
15	68	70	.....	.....	119	526	649	284	176	77	42
16	69	72	.....	.....	119	468	624	281	173	72	43
17	68	70	.....	.....	108	389	599	278	142	60	45
18	68	68	.....	.....	86	336	574	264	127	54	42
19	63	68	73	76	79	294	574	254	110	52	41
20	70	75	73	.....	72	347	567	245	105	49	40
21	70	81	72	.....	77	400	526	254	100	47	42
22	68	88	72	.....	88	562	502	259	93	47	39
23	70	70	70	.....	90	872	479	264	86	47	39
24	70	70	75	.....	90	1,060	474	294	81	47	46
25	70	70	84	.....	105	1,150	468	264	81	46	46
26	68	72	77	.....	120	1,500	485	237	79	45	46
27	68	73	75	.....	124	1,340	502	208	77	41	43
28	66	73	84	.....	150	1,170	562	190	73	40	43
29	65	73	103	.....	142	1,030	562	182	70	39	42
30	62	75	98	.....	165	1,060	550	174	66	37	42
31	75	.....	93	.....	182	.....	562	.....	62	38	.....

NOTE.—Stage-discharge relation affected by ice Dec. 3–18, Jan. 8 to Mar. 4. Discharge estimated from observer's notes, weather records, and one current-meter measurement as follows: Dec. 3–18, 63 second-feet; Jan. 8–18, 61 second-feet; Jan. 20–31, 66 second-feet; Feb. 1–8, 71 second-feet; Feb. 9–12, 75 second-feet; Feb. 13–15, 79 second-feet; Feb. 16–23, 68 second-feet; Feb. 24–28, 64 second-feet; Mar. 1–4, 77 second-feet. Discharge interpolated Oct. 2, 17, 28, Nov. 4, 9, 13, 17, 20, 21, 26, 28, Dec. 30, Jan. 6, Mar. 9, 19, 26, Apr. 20, 27, 30, May 7, 24, 26, June 5, 11, 16, 22, 30, July 2, 20, 28, Aug. 3, 7, 14, 19, 28, Sept. 4, 5, 15, 19, 30.

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Monthly discharge of Willow Creek near Ririe, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	75	62	68.1	4,190
November	88	63	71.2	4,240
December	103	.....	71.8	4,410
January	88	.....	66.1	4,060
February	.....	.....	70.3	3,900
March	182	66	98.8	6,080
April	1,500	134	536	31,900
May	1,100	468	716	44,000
June	636	174	324	19,300
July	176	62	118	7,260
August	77	37	52.0	3,200
September	46	36	40.8	2,430
The year	1,500	36	186	135,000

WILLOW CREEK NEAR IONA, IDAHO.

LOCATION.—In sec. 19, T. 3 N., R. 38 E., at concrete bridge 9 miles out on main road east from Idaho Falls. Boomer canal crosses in a flume 600 feet above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 22, 1916, to September 30, 1918.

GAGE.—Vertical staff attached to downstream face of right abutment of concrete arch bridge; read by C. N. Kemper.

DISCHARGE MEASUREMENTS.—Made from highway bridge, footbridge 50 feet downstream, or by wading.

CHANNEL AND CONTROL.—Stream bed composed of mud, sand, and gravel; shifting. Banks subject to overflow at very high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.44 feet at 11 a. m. May 2 (discharge, 264 second-feet); minimum stage recorded, 0.60 foot at 5 p. m. November 8 (discharge, 2 second-feet).

1916–1918: Maximum stage recorded, 7.75 feet May 16 and 17, 1917 (discharge, 603 second-feet); minimum stage, 0.60 foot November 8, 1918 (discharge, 2 second-feet).

ICE.—Stage-discharge relation seriously affected by ice: data inadequate for determination of daily discharge during period of ice effect.

DIVERSIONS.—Sand Creek diverts above station; also irrigation canals, but definite information as to the number of canals and quantity of water diverted is not available.

REGULATION.—Flow regulated at diversion works above station. Several irrigation canals waste water into this channel.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve fairly well defined; parallel curves used. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table or as noted in footnote to daily-discharge table. Records fair during open-water season.

Discharge measurements of Willow Creek near Iona, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 13	William Kessler	1.03	14.4	May 20	G. C. Baldwin	2.86	133
Jan. 20	G. C. Baldwin	[a] 1.04	7.9	June 25	R. B. Kilgore	3.60	179
Mar. 6	C. F. Elford	[a] 1.40	8.4	26	do	3.45	169
Apr. 8	do	1.12	22.9	July 12	G. C. Baldwin	3.02	146
11	do	2.02	69.6	Sept. 9	do	2.56	105

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Willow Creek near Iona, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	4	12	22	.....	20	255	154	142	94	74
2	20	4	12	22	.....	23	264	151	138	94	75
3	18	4	20	20	.....	26	256	151	136	90	75
4	18	4	12	18	.....	30	250	146	134	94	74
5	18	4	17	18	.....	32	250	138	130	101	74
6	18	3	12	18	.....	28	250	133	126	112	75
7	16	3	12	14	.....	27	241	130	138	122	76
8	16	2	16	10	.....	23	170	130	154	122	76
9	16	3	17	.....	.....	24	198	126	146	108	105
10	15	3	12	.....	.....	47	196	130	148	108	94
11	15	7	18	.....	.....	70	192	130	149	105	81
12	14	15	18	.....	.....	74	192	138	140	108	77
13	14	18	18	.....	.....	85	191	170	146	109	76
14	13	18	18	.....	.....	87	187	174	146	108	75
15	12	18	12	.....	.....	87	162	178	154	104	74
16	11	19	14	.....	.....	94	146	178	162	94	69
17	11	20	18	.....	46	102	152	182	166	101	73
18	10	18	18	.....	43	80	138	182	149	94	59
19	10	18	18	.....	41	69	130	178	146	94	47
20	10	19	20	.....	41	67	127	178	148	91	27
21	9	18	17	.....	38	81	111	180	148	88	37
22	8	18	18	.....	37	87	122	178	146	87	37
23	8	19	18	.....	38	187	151	174	142	88	37
24	8	19	18	.....	37	234	152	187	138	87	36
25	8	18	17	.....	36	236	146	182	134	87	34
26	7	18	18	.....	35	250	170	174	134	83	34
27	6	18	20	.....	33	260	182	170	130	81	33
28	6	18	18	.....	34	241	178	154	130	75	32
29	5	18	18	.....	33	250	162	154	126	75	32
30	4	20	22	.....	31	250	157	142	126	75	30
31	3	.....	22	.....	19	.....	160	.....	122	74	.....

NOTE.—Stage-discharge relation affected by ice Jan. 9 to Mar. 16; discharge estimated from observer's notes, weather records and two current-meter measurements as follows: Jan. 9-19, 5 second-feet; Jan. 21-31, 6 second-feet; Feb. 1-3, 2 second-feet; Feb. 4, 5 second-feet; Feb. 5-9, 6 second-feet; Feb. 10-20, 5 second-feet; Feb. 21-28, 8 second-feet; Mar. 1-5, 12 second-feet; Mar. 7-16, 35 second-feet.

Monthly discharge of Willow Creek near Iona, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	20	3	11.8	726
November	20	2	12.9	768
December	22	12	16.8	1,030
January	22	.....	8.74	537
February	.....	.....	5.71	317
March	.....	.....	31.0	1,910
April	260	20	106	6,310
May	264	111	182	11,200
June	187	126	150	9,460
July	166	122	141	8,670
August	122	74	95.3	5,860
September	105	27	59.9	3,560
The year	264	.....	69.5	50,300

GRAYS LAKE OUTLET NEAR HERMAN, IDAHO.

LOCATION.—In sec. 15, T. 3 S., R. 42 E., 3 miles below bridge at outlet of lake and 3¼ miles west of Herman, Bonneville County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 5, 1916, to September 30, 1918.

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GAGE.—Stevens continuous water-stage recorder on right bank, installed April 20, 1918; inspected by C. H. Johnson and Thomas Priest. Vertical staff at practically same site and datum used during 1916.

DISCHARGE MEASUREMENTS.—Made from cable near gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; practically permanent. No well-defined control. Left bank subject to overflow at high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.65 feet about April 25 (discharge, 624 second-feet); minimum stage recorded, 0.72 foot August 31 (discharge, 1.1 second-feet). A lower discharge may have occurred during period of no record.

1916—1918: Maximum stage recorded, 5.9 feet at 9 a. m. May 15, 1917 (discharge, 1,350 second-feet); minimum stage occurred in 1918.

ICE.—Ice practically stops flow from lake at times but springs probably keep channel near gage free from ice. Records discontinued during winter.

DIVERSIONS.—No diversions between lake and station. Diversions for irrigation are made above lake, but amount of water diverted is not known.

REGULATION.—No artificial regulation above station.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of recorder not entirely satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records prior to July 18 fair; thereafter good.

Discharge measurements of Grays Lake outlet near Herman, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	T. R. Newell	0.93	5.8	Apr. 28	C. F. Elford	4.40	512
Apr. 20	C. F. Elford	3.34	263	May 28	R. B. Kilgore	2.79	181
27	do	4.44	546	Aug. 8	G. C. Baldwin	1.11	13.9

Daily discharge, in second-feet, of Grays Lake outlet near Herman, Idaho, for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1		472	200	66	18	1.4	16		278	92	36	7.6	2.2
2		455	180	64	18	1.6	17		268	91	34	7.3	2.7
3		410	159	62	17	1.8	18		258	89	32	6.5	3.5
4		369	154	60	16	1.8	19		258	88	31	5.5	3.8
5		326	148	58	16	1.9	20	274	245	86	30	4.8	3.8
6		322	143	58	15	1.9	21	258	232	85	29	4.6	3.5
7		319	137	56	14	1.9	22	344	219	83	28	4.3	3.5
8		315	132	54	13	2.1	23	430	206	82	27	4.0	3.5
9		312	124	51	12	2.1	24	517	193	80	26	3.5	3.2
10		308	118	49	11	1.9	25	603	180	79	25	3.2	3.2
11		308	109	45	10	2.1	26	574	172	77	24	3.2	3.5
12		308	101	43	9.1	1.9	27	544	165	75	22	2.7	3.8
13		308	97	41	8.3	2.2	28	525	180	73	22	2.1	4.0
14		298	95	40	8.7	2.4	29	525	185	71	21	1.8	4.3
15		288	94	38	8.7	2.4	30	507	190	69	20	1.4	4.6
							31		195		19	1.1	

NOTE.—Discharge estimated April 21-26; interpolated May 6-9, 11, 12, 14-17, 20-24, 26, 29, 30, June 14-25, 27-30, July 1-4, 7-9, and 12-16.

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Monthly discharge of Grays Lake outlet near Herman, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 20-30	603	258	464	10,100
May	472	165	276	17,000
June	200	69	107	6,370
July	66	19	39.1	2,400
August	18	1.1	8.34	513
September	4.6	1.4	2.75	164
The period				36,500

IDAHO (GOVERNMENT) CANAL NEAR SHELLEY, IDAHO.

LOCATION.—In sec. 31, T. 1 N., R. 37 E., Bingham County, 600 feet below canal headgates, 1½ miles southwest of Shelley, and 10 miles above point where Sand Creek crosses canal.

RECORDS AVAILABLE.—June 20, 1912, to September 30, 1918. No water diverted during 1913 because of break in the canal.

GAGE.—Inclined staff on right bank set in the concrete of the rating section; read by Mitchell and Vaughn.

DISCHARGE MEASUREMENTS.—Made by wading or from a suspension footbridge at the gage.

CHANNEL AND CONTROL.—Trapezoidal concrete rating section. Growth of weeds and brush causes changes in the stage-discharge relation, but bottom of rating section evidently furnishes a permanent point of zero flow at about 0.0 foot gage height.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.83 feet at 9 a. m. July 29 (discharge, 262 second-feet); minimum flow probably zero when headgates are closed, but has not been definitely determined, as no records are obtained when gates are closed.

1912–1918: Maximum stage recorded, 3.7 feet July 29, 1912 (discharge, 308 second-feet); minimum as stated above.

ICE.—Canal not operated during winter.

DIVERSIONS.—None.

REGULATION.—Flow controlled at the headgates 600 feet above.

ACCURACY.—Stage-discharge relation not permanent; affected by growth of vegetation. Rating curve well defined; several parallel curves used. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table or by shifting-control method. Records fair.

Discharge measurements of Idaho (Government) canal near Shelley, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 19	Baldwin and Newell	0.30	4.5	July 17	G. C. Baldwin	2.00	170
June 15	Elford and Martin	2.42	222	30	C. F. Elford	2.65	228
27	R. B. Kilgore	2.50	220	Aug. 16	do	2.76	228
27	C. F. Elford	2.50	223	Sept. 10	G. C. Baldwin	2.60	210

—D. G. Martin and C. F. Elford, State employees.

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Daily discharge, in second-feet, of Idaho (Government) canal near Shelley, Idaho, for the year ending Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1			193	224	190	16		224	191	215	200
2			216	211	191	17		237	169	199	200
3			226	211	195	18		244	191	200	198
4			222	221	201	19	5	244	222	199	156
5			222	223	201	20		252	222	193	156
6			224	233	211	21		252	215	187	156
7			224	232	200	22		252	215	204	167
8			224	213	200	23		246	222	203	167
9			222	215	198	24		226	224	203	167
10			213	225	200	25		196	224	201	168
11		100	218	217	200	26		193	224	196	167
12		186	224	216	203	27		218	218	189	167
13		193	221	208	205	28		233	252	187	166
14		208	222	204	203	29		222	253	189	165
15		213	213	228	203	30		211	240	192	165
						31			240	192	

NOTE.—Discharge, May 20 to June 10, estimated at 5 se ond-feet on assumption that leakage through headgates noted May 19 continued throughout the period.

Monthly discharge of Idaho (Government) canal near Shelley, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 19-31			5	129
June	252		147	8,750
July	253	169	220	13,500
August	233	187	207	12,700
September	211	156	186	11,100
The period				46,200

BLACKFOOT RIVER ABOVE RESERVOIR, NEAR HENRY, IDAHO.

LOCATION.—About sec. 9, T. 7 S., R. 42 E., at Cully's ranch, 1½ miles above flow line of Blackfoot-Marsh reservoir, 7 miles south of Henry, Bannock County, and 13 miles north of Soda Springs.

DRAINAGE AREA.—360 square miles (measured on Land Office map).

RECORDS AVAILABLE.—March 25, 1914, to September 30, 1918.

GAGE.—Inclined staff on right bank half a mile above Cully's house and 200 feet below shearing plant; installed October 12, 1917, at practically same location and datum as vertical staff used since October 23, 1914. Read by Mrs. T. W. Cully and Mrs. A. C. Swanson. Original gage was vertical staff attached to right bridge pier three-quarters of a mile above.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of loose rocks, boulders, and gravel. Control composed of loose rock; fairly permanent. Right bank subject to overflow at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.45 feet at 9.30 a. m. May 30 (discharge, 520 second-feet); minimum stage recorded, 1.46 feet September 2, 3, and 18 (discharge, 58 second-feet). Minimum discharge for year probably occurred during period of no record.

1914–1918: Maximum stage, 6.85 feet May 16, 1917, estimated from high-water mark above gage (discharge, 2,060 second-feet); minimum stage recorded, 1.65 feet November 13, 1916 (measured discharge, 52 second-feet). Minimum discharge probably occurred during winter.

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ICE.—Stage-discharge relation affected by ice; observations discontinued during winter.

DIVERSIONS.—A few small diversions are made above gage.

REGULATION.—None. Entire flow passing gage is stored in Blackfoot-Marsh reservoir 1½ miles below.

ACCURACY.—Stage-discharge relation shifted slightly. Rating curve fairly well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table, except during period June 3 to August 5, for which shifting-control method was used. Records good, except for December for which they are fair.

Discharge measurements of Blackfoot River above reservoir, near Henry, Idaho, during year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 21	T. R. Newell	1.74	98.1	June 1	R. B. Kilgore	2.86	326
Mar. 9	C. F. Elford	2.70	73.8	2	do	2.80	326
Apr. 24	do	3.03	401	Aug. 6	G. C. Baldwin	1.69	86.1

Daily discharge, in second-feet, of Blackfoot River above reservoir, near Henry, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	115	89	95	99	.....	214	455	347	127	87	65
2	121	99	89	82	.....	238	487	318	134	87	58
3	96	95		86	.....	172	503	287	127	83	58
4	100	95		92	.....	154	487	287	132	83	62
5	96	86		89	.....	137	487	287	132	83	62
6	100	82		.....	.....	120	503	274	124	86	65
7	110	89		.....	.....	135	471	274	95	89	67
8	106	99		.....	.....	154	408	274	109	82	69
9	103	86		.....	74	192	392	260	116	79	69
10	106	82	80	.....	.....	250	455	260	116	79	73
11	103	89		.....	.....	318	439	260	112	79	69
12	100	82		.....	.....	377	408	248	121	79	67
13	96	99		.....	.....	377	347	236	132	89	67
14	103	89		.....	.....	332	304	224	258	82	67
15	100	82		.....	.....	332	290	212	233	79	67
16	96	99		.....	.....	318	304	236	207	79	67
17	103	95		.....	.....	318	318	224	158	86	65
18	92	92	92	.....	.....	238	332	224	140	82	58
19	103	73	99	.....	.....	250	377	236	132	77	62
20	103	67	95	.....	.....	238	377	212	123	73	62
21	98	82	103	.....	98	226	276	201	126	77	62
22	95	118	103	.....	95	238	263	224	115	77	65
23	98	137	92	.....	120	347	250	201	108	73	73
24	103	82	95	.....	91	392	263	258	105	73	73
25	95	89	95	.....	124	362	290	178	100	73	69
26	99	95	99	.....	120	439	304	168	96	73	73
27	103	103	89	.....	115	487	347	151	105	69	69
28	92	86	106	.....	112	377	362	142	93	67	67
29	86	124	129	.....	135	332	439	168	91	67	67
30	118	82	118	.....	154	408	520	142	91	67	73
31	124	.....	92	.....	163	.....	455	.....	87	67	.....

NOTE.—Braced figure shows estimated mean discharge for period indicated.

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Monthly discharge of Blackfoot River above reservoir, near Henry, Idaho, for the year ending Sept. 30, 1918.

[Drainage area, 360 square miles.]

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	124	86	102	6,270
November	137	67	92.2	5,490
December	129	.....	90.0	5,530
January 1-5	99	82	89.6	889
March 21-31	163	91	121	2,640
April	487	120	282	16,800
May	520	250	384	23,600
June	347	142	234	13,900
July	258	87	127	7,810
August	89	67	78.3	4,810
September	77	58	66.5	3,960

BLACKFOOT-MARSH RESERVOIR NEAR HENRY, IDAHO.

LOCATION.—In sec. 12, T. 5 S., R. 40 E., 12 miles northwest of Henry, Bannock County.

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1918.

GAGE.—Vertical staff near spillway at right end of dam; read by B. B. Reynolds. Prior to April 23, 1918, all gage readings were made on gage 51.6 feet higher in elevation. All gage readings subsequent to April 23, 1918, are corrected to agree with former datum. To reduce gage heights to elevation above sea level add 6048.40 feet.

EXTREMES OF STAGE.—Maximum stage recorded during year, 61.00 feet May 26 and 27; minimum stage, 52.00 feet October 10.

1912-1918: Maximum stage recorded, 68.60 feet June 27-30, 1912; minimum stage, 42.02 feet December 14, 1916.

ACCURACY.—Gage affected by ice and gage heights prior to April 18 may be a maximum of about 1.70 feet in error in reference to correct datum.

COOPERATION.—Gage-height record furnished by United States Indian Service.

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Daily gage height, in feet, of Blackfoot-Marsh reservoir near Henry, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	52.55	52.42	53.06	54.20	55.05	55.39	56.49	60.54	60.94	59.74	57.42	54.58
2	52.44	52.43	53.08	54.22	55.09	55.40	56.56	60.58	60.92	59.69	57.32	54.56
3	52.39	52.44	53.16	54.24	55.12	55.41	56.62	60.61	60.90	59.64	57.22	54.54
4	52.32	52.45	53.22	54.26	55.12	55.42	56.67	60.64	60.86	59.59	57.12	54.52
5	52.24	52.46	53.30	54.28	55.14	55.43	56.72	60.68	60.83	59.54	57.02	54.50
6	52.19	52.47	53.36	54.30	55.16	55.44	56.76	60.70	60.82	59.48	56.92	54.50
7	52.14	52.48	53.38	54.32	55.20	55.45	56.81	60.72	60.80	59.42	56.82	54.49
8	52.08	52.49	53.40	54.34	55.22	55.46	56.86	60.74	60.80	59.34	56.72	54.48
9	52.02	52.50	53.43	54.36	55.24	55.47	56.91	60.74	60.78	59.27	56.58	54.47
10	52.00	52.52	53.46	54.38	55.27	55.50	56.96	60.76	60.76	59.22	56.49	54.46
11	52.02	52.54	53.48	54.40	55.30	55.52	57.02	60.77	60.75	59.14	56.38	54.45
12	52.04	52.54	53.50	54.42	55.32	55.54	57.12	60.78	60.73	59.08	56.28	54.45
13	52.06	52.56	53.52	54.44	55.34	55.56	57.21	60.81	60.69	59.02	56.16	54.45
14	52.08	52.60	53.54	54.46	55.34	55.60	57.30	60.84	60.64	58.95	56.07	54.45
15	52.10	52.62	53.56	54.48	55.34	55.63	57.38	60.86	60.60	58.88	55.96	54.44
16	52.12	52.65	53.58	54.51	55.35	55.67	57.49	60.88	60.57	58.81	55.86	54.44
17	52.14	52.70	53.60	54.54	55.35	55.72	57.64	60.90	60.52	58.74	55.77	54.44
18	52.15	52.76	53.65	54.56	55.36	55.80	57.75	60.91	60.46	58.70	55.68	54.44
19	52.16	52.81	53.72	54.60	55.36	55.88	.....	60.92	60.40	58.62	55.57	54.45
20	53.20	52.84	53.76	54.64	55.36	55.95	.....	60.94	60.34	58.56	55.47	54.44
21	52.22	52.86	53.83	54.68	55.36	55.99	.....	60.96	60.31	58.48	55.38	54.45
22	52.24	52.88	53.90	54.71	55.37	56.04	.....	60.96	60.27	58.44	55.28	54.44
23	52.26	52.90	53.95	54.74	55.37	56.08	59.85	60.98	60.28	58.37	55.18	54.42
24	52.28	52.92	53.99	54.78	55.37	56.14	59.94	60.98	60.24	58.28	55.08	54.42
25	52.30	52.94	54.03	54.81	55.38	56.18	60.02	60.99	60.19	58.16	54.98	54.41
26	52.32	52.96	54.07	54.86	55.38	56.22	60.08	61.00	60.12	58.04	54.90	54.40
27	52.34	52.98	54.10	54.88	55.38	56.26	60.18	61.00	60.06	57.92	54.82	54.39
28	52.36	53.00	54.12	54.91	55.38	56.31	60.28	60.99	59.98	57.82	54.74	54.39
29	52.38	53.02	54.14	54.95	.....	56.36	60.38	60.99	59.90	57.72	54.69	54.38
30	52.40	53.04	54.16	54.99	.....	56.41	60.48	60.98	59.81	57.62	54.65	54.38
31	52.40	.....	54.18	55.02	.....	56.45	.....	60.96	.....	57.52	54.61	.....

NOTE.—Gage torn out by ice Apr. 18; reset Apr. 23.

BLACKFOOT RIVER NEAR HENRY, IDAHO.

LOCATION.—In sec. 11, T. 5 S., R. 40 E., 200 feet below wagon bridge at Rockyford crossing, 1 mile below Blackfoot-Marsh dam of United States Indian Service, and 12 miles northwest of Henry, Bannock County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 15, 1908, to September 30, 1918.

GAGE.—Friez water-stage recorder installed September 18, 1912, on left bank; inspected by B. B. Reynolds. Prior to September 18, 1912, gage was vertical staff located a few feet downstream from present gage. Datum of original gage lowered 0.11 foot between July 15, 1908, and May 25, 1912; datum of present gage is same as original gage on May 25, 1912.

DISCHARGE MEASUREMENTS.—Made from cable 600 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of lava rock, boulders, and gravel; fairly permanent. Control affected at times by growth of moss.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.02 feet June 22 (discharge, 760 second-feet); minimum stage, 0.95 foot April 24 to May 6 (discharge, 23 second-feet).

1908–1918: Maximum stage recorded, 4.15 feet May 14, 1909 (discharge, 1,640 second-feet); minimum stage recorded, 0.50 foot May 11 and 12, 1917 (discharge, 1 second-foot).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Few small diversions for irrigation above station.

REGULATION.—Flow entirely regulated by storage in reservoir, which has a capacity of 312,000 acre-feet.

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ACCURACY.—Stage-discharge relation affected by growth of moss. Two well-defined rating curves used, one October 1 to 8, the other October 9 to June 25; shifting-control method used June 26 to August 7. Operation of water-stage recorder satisfactory during periods October 1–8 and June 8–30; staff gage read to hundredths twice daily during remaining periods. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in footnote to daily-discharge table. Records good, except from July to September for which they are fair.

Discharge measurements of Blackfoot River near Henry, Idaho, during the year ending Sept. 30, 1918.

Date	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 13	T. R. Newell	1.50	133	Apr. 23	C. F. Elford	1.92	270
Apr. 22	C. F. Elford	1.25	75.3	May 31	R. B. Kilgore	2.50	515
23	do	2.10	342	Aug. 7	G. C. Baldwin	2.96	634

Daily discharge, in second-feet, of Blackfoot River near Henry, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	522	73	73	73	73	73	73	23	515	673	640	
2	522	73	73	73	73	73	73	23	515	673	640	
3	522	73	73	73	73	73	73	23	515	673	640	
4	522	73	73	73	73	73	73	23	515	673	640	370
5	522	73	73	73	73	73	73	23	515	673	640	
6	522	73	73	73	73	73	73	23	515	673	640	
7	522	73	73	73	73	73	73	156	515	673	635	
8	522	73	73	73	73	73	73	156	515	673		
9	404	73	73	73	73	73	73	156	515	673		
10	321	73	73	73	73	73	73	156	515	668		
11	321	73	73	73	73	73	73	156	584	668		320
12	207	73	73	73	73	73	73	301	607	668		
13	139	73	73	73	73	73	73	301	607	668		
14	184	73	73	73	73	73	73	301	607	668	630	
15	227	73	73	73	73	73	73	301	607	668		
16	227	73	73	73	73	73	73	301	607	668		
17	224	73	73	73	73	73	73	301	607	668		
18	133	73	73	73	73	73	73	470	630	668		
19	73	73	73	73	73	73	73	470	702	668		
20	73	73	73	73	73	73	73	470	750	668		
21	73	73	73	73	73	73	73	470	750	668		185
22	73	73	73	73	73	73	73	470	750	668		
23	73	73	73	73	73	73	123	515	750	668		
24	73	73	73	73	73	73	23	515	750	664	475	
25	73	73	73	73	73	73	23	515	726	664		
26	73	73	73	73	73	73	23	515	721	640		
27	73	73	73	73	73	73	23	515	721	640		
28	73	73	73	73	73	73	23	515	721	640		
29	73	73	73	73	.....	73	23	515	721	640	400	85
30	73	73	73	73	.....	73	23	515	697	640		
31	73	.....	73	73	.....	73	.....	515	.....	640		.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated by comparison with flow at station near Shelley.

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Monthly discharge of Blackfoot River near Henry, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	522	73	242	14,900
November	73	73	73.0	4,340
December	73	73	73.0	4,490
January	73	73	73.0	4,490
February	73	73	73.0	4,050
March	73	73	73.0	4,490
April	123	23	63.0	3,750
May	515	23	313	19,200
June	750	515	626	37,200
July	673	640	664	40,800
August	640	.....	565	34,700
September	.....	.....	256	15,200
The year	750	23	259	188,000

BLACKFOOT RIVER NEAR SHELLEY, IDAHO.

LOCATION.—In sec. 7, T. 2 S., R. 38 E., Bingham County, 1½ miles above mouth of canyon, 3 miles above N. A. Just's ranch, 10 miles southeast of Shelley, and 18 miles northeast of Blackfoot. Below all important tributaries.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 26, 1909, to September 30, 1918. From April 17, 1903, to December 31, 1909, records were obtained near Presto, about 5 miles below site of present station. No tributaries enter between the two sites, but during the irrigation season several ditches divert probably 50 second-feet.

GAGE.—Friez water-stage recorder on right bank; inspected by Rufus E. Reid.

DISCHARGE MEASUREMENTS.—Made by wading or from cable at gage.

CHANNEL AND CONTROL.—Bed rocky and rough. One channel at all stages. Control somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 5.37 feet at 11 p. m. June 20 (discharge, 986 second-feet); minimum stage recorded, 3.38 feet at 11 p. m. December 11 (discharge, 87 second-feet).

1909–1918: Maximum stage recorded, 5.80 feet at 11.45 p. m. April 1, 1913 (discharge, 1,370 second-feet); minimum stage, 3.00 feet at 12.30 p. m. January 6, 1917 (discharge estimated less than 45 second-feet).

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—No noteworthy diversions are made from river or tributaries above station.

REGULATION.—Flow regulated largely by storage in the Blackfoot-Marsh reservoir of the United States Indian Service, about 40 miles upstream.

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined for open-channel conditions. Operation of water-stage recorder satisfactory except during winter when occasional staff observations were obtained. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

Discharge measurements of Blackfoot River near Shelley, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	William Kessler	3.68	173	Apr. 16	C. F. Elford	3.92	255
Mar. 4	C. F. Elford	3.47	125	June 20	R. B. Kilgore	5.14	807
12	.....do	3.56	136	Aug. 15	G. C. Baldwin	4.88	680

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Daily discharge, in second-feet, of Blackfoot River near Shelley, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	613	145	158	130	.....	120	267	188	653	797	769	442
2	608	145	139	127	.....	121	263	188	653	769	769	438
3	603	145	121	127	.....	110	213	188	648	769	769	438
4	603	148	164	127	.....	113	199	192	643	769	769	433
5	603	148	139	127	121	102	195	195	638	797	764	433
6	603	145	127	118	110	108	192	228	638	769	758	428
7	603	148	113	136	110	158	199	299	638	764	753	424
8	603	148	118	133	113	121	217	295	633	764	747	428
9	569	148	130	.....	108	108	259	308	633	764	731	433
10	424	145	113	.....	126	108	308	303	623	758	710	393
11	420	148	95	.....	151	127	299	295	643	758	699	380
12	384	148	124	.....	155	127	291	329	710	753	689	376
13	228	148	136	.....	142	121	312	350	710	753	689	376
14	225	148	145	.....	.....	110	320	380	710	769	699	376
15	303	148	130	.....	.....	110	283	460	715	758	731	376
16	308	148	127	127	.....	115	255	574	726	747	699	324
17	303	148	136	127	.....	121	240	584	720	742	684	255
18	295	145	133	133	.....	127	228	598	715	737	673	244
19	178	145	133	113	.....	124	225	618	764	731	673	244
20	161	142	133	110	.....	130	217	608	883	731	673	240
21	158	145	130	121	.....	130	221	598	883	742	658	240
22	148	148	130	130	.....	136	236	598	883	747	545	244
23	148	145	127	133	133	139	291	643	913	753	540	244
24	148	145	136	133	133	145	259	653	883	758	540	244
25	145	151	133	136	124	158	225	653	854	769	540	244
26	145	151	133	133	118	171	213	663	854	797	535	244
27	145	139	136	.....	136	195	206	679	854	797	530	244
28	145	142	145	.....	120	199	188	694	825	797	474	181
29	171	148	158	.....	.....	210	181	679	825	797	451	142
30	151	148	155	.....	.....	228	185	658	825	797	446	139
31	145	.....	139	.....	.....	251	.....	658	.....	797	446	.....

NOTE.—Stage-discharge relation affected by ice Jan. 9–15; Jan. 26 to Feb. 4; Feb. 14–22; discharge estimated from observer's notes, weather records, and record at station below Blackfoot-Marsh reservoir as follows: Jan. 9–15, 110 second-feet; Jan. 27–31, 115 second-feet; Feb. 1–4, 105 second-feet; Feb. 14–22, 120 second-feet.

Monthly discharge of Blackfoot River near Shelley, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	613	145	332	20,400
November	151	139	146	8,690
December	164	95	133	8,180
January	136	.....	121	7,440
February	155	.....	121	6,720
March	251	102	140	8,610
April	320	181	240	14,300
May	694	188	463	28,500
June	913	623	743	44,200
July	797	731	766	47,100
August	769	446	650	40,000
September	442	139	322	19,200
The year	913	.....	350	253,000

BLACKFOOT RIVER NEAR BLACKFOOT, IDAHO.

LOCATION.—In sec. 27, T. 3 S., R. 34 E., Bingham County, at old Jarvis ranch, 2 miles above junction of Blackfoot and Snake rivers and 8 miles southwest of Blackfoot.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 27, 1913, to September 30, 1918.

GAGE.—Inclined staff on right bank half a mile south of the Jarvis ranch house; read by Oliver L. Kofoed.

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DISCHARGE MEASUREMENTS.—Made by wading or from cable near gage.

CHANNEL AND CONTROL.—Bed composed of gravel. Control presumably of the same material; fairly permanent. One channel at all stages. Banks covered with heavy growth of brush and willows which may affect stage-discharge relation at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, in excess of 9.3 feet during period June 15-18 when stage-discharge relation was affected by overflow and backwater from Snake River. Maximum discharge attributable to Blackfoot River probably 544 second-feet noted September 16 at gage height of 8.1 feet; minimum stage probably occurred during period of no record when water surface was below gage (estimated discharge, 18 second-feet).

1913-1918: Maximum discharge recorded, 673 second-feet September 21-22, 1914; minimum stage as above noted.

ICE.—No records obtained during winter.

DIVERSIONS.—Principal diversions above gage are the Fort Hall canals near Blackfoot, but several smaller diversions are made near Blackfoot.

REGULATION.—Flow regulated by storage in the Blackfoot-Marsh reservoir of the United States Indian Service.

ACCURACY.—Stage-discharge relation permanent during period of record. Rating curve fairly well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Discharge measurements of Blackfoot River near Blackfoot, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 21	T. R. Newell	5.76	187	Aug. 14	G. C. Baldwin	5.71	168
July 9	G. C. Baldwin	6.19	261	Sept. 10	do	6.33	273
Aug. 2	do	4.42	18.3				

Daily discharge, in second-feet, of Blackfoot River near Blackfoot, Idaho, for the year ending Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	434	374	315	23	73	16	198	.....	496	359	544
2	389	374	259	18	73	17	198	.....	496	434	496
3	374	374	259	23	68	18	232	.....	464	496	374
4	315	359	259	109	132	19	217	.....	329	496	301
5	287	245	287	109	141	20	198	.....	344	449	198
6	259	217	315	109	154	21	198	.....	315	389	84
7	259	102	245	78	166	22	96	.....	301	374	90
8	259	73	217	84	245	23	96	.....	245	344	102
9	259	73	259	73	259	24	109	.....	224	344	96
10	245	63	287	73	273	25	109	.....	208	301	198
11	287	43	301	78	287	26	198	.....	232	259	154
12	245	18	315	198	287	27	315	.....	78	217	141
13	245	.....	315	166	287	28	389	329	73	141	123
14	198	.....	374	182	315	29	389	344	78	208	141
15	166	.....	480	217	344	30	389	374	63	73	141
						31	359	.....	23	84	.....

NOTE.—Stage-discharge relation, June 13-27, affected by overflow and backwater from Snake River; data insufficient for determination of discharge. Water reported as below gage about 0.10 foot on June 12.

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Monthly discharge of Blackfoot River near Blackfoot, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May	434	96	255	15,700
July	496	23	273	16,800
August	496	18	210	12,900
September	544	68	210	12,500

LITTLE BLACKFOOT RIVER AT HENRY, IDAHO.

LOCATION.—In sec. 10, T. 6 S., R. 42 E., on Skinner's ranch at Henry, Bannock County, a short distance above flow line of Blackfoot-Marsh reservoir.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 24, 1914, to September 30, 1918.

GAGE.—Vertical staff fastened to log across stream just below Skinner's barn; read by Mrs. W. J. Chester.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of rock overlain with sand and gravel. Control is rock crest of 8-foot falls; affected by growth of aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.53 feet at 5 p. m. April 13 (discharge, 138 second-feet); minimum discharge estimated at 11 second-feet from August 16 to 20 and from September 28 to 30.

1914–1918: Maximum stage recorded, 3.5 feet at 8 p. m. April 19, 1914 (discharge, determined from extension of rating curve, 292 second-feet); minimum stage, 1.20 feet March 24, April 1 and 2, and July 4 at 6 p. m. to July 7,1914 (minimum discharge determined by indirect method for shifting control, 7 second-feet on July 5, 6, and 7, 1914).

ICE.—Stage-discharge relation not affected by ice on account of warm springs.

DIVERSIONS.—One small diversion above station and one below.

REGULATION.—No artificial regulation.

ACCURACY.—Stage-discharge relation affected by growth of aquatic plants. Standard rating curve fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table from October 26 to May 14; shifting-control method used during remainder of year. Records fair during summer; good for remainder of year.

Discharge measurements of Little Blackfoot River at Henry, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	T. R. Newell	1.52	21.0	May 29	R. B. Kilgore	1.95	34.0
Mar. 7	C. F. Elford	1.28	14.3	Aug. 6	G. C. Baldwin	1.64	16.2
Apr. 19	do	1.45	24.6				

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Daily discharge, in second-feet, of Little Blackfoot River at Henry, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	17	19	22	16	15	14	26	26	25	23	18	13
2	18	19	22	16	14	14	26	30	25	23	18	14
3	18	19	21	16	14	14	25	33	25	25	18	14
4	17	19	20	16	14	14	23	36	25	25	18	14
5	16	19	20	16	14	14	22	37	25	24	17	14
6	17	19	20	16	14	14	21	36	25	23	16	14
7	18	19	20	16	14	14	20	35	25	23	16	14
8	18	19	20	16	13	14	22	35	24	22	16	15
9	19	19	19	16	14	14	37	37	24	22	16	15
10	19	19	18	16	14	14	49	40	25	22	14	14
11	19	19	18	16	14	14	52	41	24	21	14	14
12	20	20	18	16	14	14	105	35	24	22	14	12
13	20	19	18	14	14	14	136	35	23	22	13	12
14	19	19	16	14	14	14	62	35	23	22	13	12
15	17	19	16	14	14	14	45	35	27	20	13	12
16	16	19	16	14	14	14	33	34	27	20	11	13
17	16	20	16	14	14	14	27	36	28	22	11	13
18	17	20	16	14	14	14	26	41	28	21	11	12
19	17	20	16	14	14	14	25	38	28	21	11	13
20	18	20	16	14	14	14	28	31	28	21	11	13
21	18	20	16	14	13	14	30	30	28	21	13	12
22	19	20	16	14	13	14	30	28	28	18	13	12
23	19	20	16	14	14	14	28	28	25	18	14	13
24	20	20	16	14	14	14	25	28	25	17	13	12
25	20	21	16	14	14	14	27	28	25	19	13	12
26	21	21	16	14	14	14	28	28	23	21	13	12
27	20	21	16	14	14	16	28	28	25	17	13	12
28	20	21	16	14	14	19	28	37	24	17	14	11
29	20	21	16	16	.....	21	28	33	23	18	14	11
30	19	22	18	14	.....	20	28	28	24	17	14	11
31	19	.....	18	14	.....	21	.....	28	.....	17	14	.....

Monthly discharge of Little Blackfoot River at Henry, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	21	16	18.4	1,130
November	22	19	19.7	1,170
December	22	16	17.7	1,090
January	16	14	14.8	910
February	15	13	13.9	772
March	21	14	14.9	916
April	136	20	36.3	2,160
May	41	26	33.2	2,040
June	28	23	25.3	1,510
July	25	17	20.8	1,280
August	18	11	14.1	867
September	15	11	12.8	762
The year	136	11	20.2	14,600

MEADOW CREEK NEAR HENRY, IDAHO.

LOCATION.—In sec. 3, T. 6 S., R. 42 E., half a mile above flow line of Blackfoot-Marsh reservoir, three-quarters of a mile below Goose Lake or Pelican Slough, and 1½ miles northeast of Henry, Bannock County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 17, 1914, to September 30, 1918.

GAGE.—Stevens water-stage recorder installed June 27, 1914, on left bank, referred to vertical staff at same location and datum.

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DISCHARGE MEASUREMENTS.—Made by wading or from cable at gage.

CHANNEL AND CONTROL.—Bed composed of rock and gravel; somewhat shifting. No well-defined control. At high stages partial control may be heavy growth of brush on banks.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.40 feet at 3 p. m., April 17 (discharge, 114 second-feet); minimum stage, 1.20 feet at 2 a. m. September 11 (discharge, about 3 second-feet).

1914–1918: Maximum stage recorded, 4.81 feet May 17, 1917 (discharge, 424 second-feet); minimum stage, 1.06 feet July 17, 1916 (discharge, about 0.4 second-foot).

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—None above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Two fairly well defined rating curves used, one October 1 to November 15, April 17 to May 25, and July 2 to September 30, the other from May 30 to June 25. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph and by indirect method for shifting control. Records fair.

Discharge measurements of Meadow Creek near Henry, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 21	T. R. Newell	1.93	16.6	May 30	R. B. Kilgore	2.79	51.0
Apr. 18	C. F. Elford	3.24	95.5	Aug. 7	G. C. Baldwin	1.74	12.1

Daily discharge, in second-feet, of Meadow Creek near Henry, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	14	17	.....	77	46	8	12	9
2	14	18	.....	75	42	8	13	9
3	14	18	.....	71	38	8	12	9
4	14	18	.....	70	34	8	12	8
5	14	18	.....	68	32	7	12	8
6	14	18	.....	67	29	7	12	8
7	14	18	.....	64	27	7	12	9
8	15	18	.....	62	25	6	12	9
9	15	18	.....	60	23	7	12	9
10	16	18	.....	60	21	8	12	5
11	16	18	.....	62	18	8	12	5
12	17	18	.....	61	16	9	12	5
13	17	18	.....	56	14	10	11	6
14	17	18	.....	51	13	13	12	6
15	17	19	.....	49	12	13	13	5
16	17	.....	.....	47	11	12	14	6
17	17	.....	110	47	10	12	14	5
18	17	.....	96	47	11	12	14	5
19	17	.....	89	47	11	12	13	5
20	18	.....	83	47	11	19	13	6
21	17	.....	79	45	11	20	12	6
22	17	.....	79	42	12	16	12	6
23	17	.....	89	40	11	14	12	7
24	17	.....	100	40	12	12	11	7
25	18	.....	106	39	12	12	11	7
26	18	.....	108	40	12	12	11	7
27	17	.....	107	40	11	12	11	7
28	17	.....	100	46	10	12	10	7
29	17	.....	89	51	8	12	9	7
30	17	.....	81	51	8	12	9	7
31	17	.....	.....	48	.....	11	9	.....

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Monthly discharge of Meadow Creek near Henry, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	18	14	16.2	996
November 1-15	19	17	18.0	536
April 17-30	110	79	94.0	2,610
May	77	39	53.9	3,310
June	46	8	18.4	1,090
July	20	6	10.9	670
August	14	9	11.8	726
September	9	5	6.8	406

IDAHO (GOVERNMENT) CANAL NEAR FIRTH, IDAHO.

LOCATION.—In sec. 13, T. 2 S., R. 36 E., Bingham County, 100 feet above double metal flume by which canal crosses Eastern Idaho Slough, one-fourth of a mile below nearest highway bridge, 1½ miles below point where Sand Creek crosses canal, and about 5 miles southeast of Firth.

RECORDS AVAILABLE.—March 29, 1914, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank; inspected by J. A. Vaughn.

DISCHARGE MEASUREMENTS.—Made by wading or from one of the highway bridges above.

CHANNEL AND CONTROL.—Bed composed of silt, sand, and fine gravel; probably shifts slightly but flume heading just below furnishes a permanent control for high stages. Point of zero flow at about 0.5 to 0.6 foot gage height.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.45 feet in the morning September 6 (discharge, 430 second-feet); zero discharge reported March 22.

1914–1918: Maximum stage recorded. 5.45 feet in the morning September 6, 1918 (discharge, 430 second-feet); minimum discharge, no flow, on several dates.

ICE.—Stage-discharge relation seriously affected by ice. Data inadequate for determination of winter discharge.

DIVERSIONS.—None.

REGULATION.—Flow partly regulated by Snake River headgates, about 12 miles above. and partly by gates at the Sand Creek crossing, about 1½ miles above.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined. Several parallel curves used. Operation of water-stage recorder satisfactory except for period of ice effect when the staff gage was read daily. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, except as noted in footnote to table of daily discharge. Records good for periods for which daily discharge was computed.

Idaho (Government) canal diverts water from left bank of Snake River in sec. 31. T. 1 N., R. 37 E., and discharges into Blackfoot River in sec. 24, T. 2 S., R. 36 E. The canal receives water from Sand Creek just above this station.

Discharge measurements of Idaho (Government) canal near Firth, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	William Kessler	2.35	69.1	Apr. 15	C. F. Elford	3.29	180
21	do	2.25	64.7	16	do	3.23	169
Jan. 14	G. C. Baldwin	[a] .71	.05	May 19	Newell and Baldwin	2.37	81.9
Mar. 3	C. F. Elford	[a] 1.30	1.0	June 19	R. B. Kilgore	4.18	233
13	do	[a] 1.70	9.0	29	do	4.20	270

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Idaho (Government) canal near Firth, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	57	70	33	27	.....	29	227	239	245	216	257
2	69	55	.....	21	.....	30	227	245	245	216	269
3	69	53	.....	20	.....	21	227	251	263	245	299
4	54	56	.....	18	.....	30	233	222	281	281	335
5	35	38	.....	20	.....	45	239	178	257	263	311
6	33	19	.....	18	.....	53	239	156	239	227	411
7		21	.....	21	.....	48	239	150	263	194	398
8		16	.....	16	.....	36	205	156	257	216	398
9		19	.....	13	.....	36	205	188	251	233	372
10	37	19	.....	.....	.....	55	194	135	251	263	348
11		21	.....	.....	.....	92	183	70	257	245	324
12		26	2	.....	.....	117	188	178	281	233	299
13	41	28	12	.....	.....	127	172	188	281	227	275
14	43	20	50	.....	.....	144	161	205	323	205	251
15	43	22	19	.....	.....	168	150	210	347	269	275
16	42	22	32	.....	.....	169	129	215	347	347	269
17	48	24	39	.....	.....	154	123	229	275	311	239
18	54	18	33	.....	11	138	97	224	269	299	233
19	66	24	26	.....	14	113	80	229	227	257	188
20	67	25	20	.....	7	103	87	265	188	227	188
21	65	22	24	.....	23	116	60	308	200	222	233
22	67	17	18	.....	0	135	54	353	166	251	222
23	61	22	14	.....	21	161	82	372	188	275	227
24	49	28	15	.....	21	183	145	398	210	257	239
25	51	27	15	.....	24	205	205	353	194	251	257
26	51	28	16	.....	21	233	293	275	194	239	257
27	46	27	19	.....	36	243	287	263	194	216	257
28	64	30	20	.....	29	257	257	305	227	194	257
29	75	30	18	.....	34	257	239	293	251	205	257
30	70	30	20	.....	34	233	227	257	216	269	257
31	70	.....	27	.....	115	.....	227	.....	216	239	.....

NOTE.—Discharge, Oct. 7-12, Oct. 30 to Nov. 2 and Mar. 31 to Apr. 5, estimated. Stage-discharge relation affected by ice Dec. 2-11; Jan. 10 to Mar. 17; discharge, Dec. 2-11, estimated from observer's notes and temperature record at 12 second-feet. Data inadequate for determination of discharge Jan. 10 to Mar. 17 except for days when current-meter measurements were made. Sept. 10-13 interpolated.

Monthly discharge of Idaho (Government) canal near Firth, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	75	.....	52.0	3,200
November	70	16	28.6	1,700
December	50	2	19.1	1,170
January 1-9	27	13	19.3	315
March 18-31	115	0	27.9	775
April	257	21	124	7,380
May	293	54	183	11,300
June	398	70	237	14,100
July	347	166	245	15,100
August	347	194	245	15,100
September	411	188	280	16,700

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SAND CREEK NEAR FIRTH, IDAHO.

LOCATION.—In T. 2 S., R. 37 E., Bingham County, 400 feet downstream from point where Idaho (Government) canal crosses creek and 4 miles east of Firth.

RECORDS AVAILABLE.—December 21, 1916, to September 30, 1918.

GAGE.—Vertical staff on left bank on upstream side of highway bridge; read by J. A. Vaughn. Prior to May 17, 1917, vertical staff on left bank, 300 feet upstream.

DISCHARGE MEASUREMENTS.—Made by wading, from highway bridge, or from small flume crossing creek 50 feet downstream.

CHANNEL AND CONTROL.—Bed composed of silt, sand, and fine gravel; probably not permanent. Banks clean but subject to overflow at high stages. Point of zero flow, about 0.8 foot gage height.

EXTREMES OF DISCHARGE.—1916–1918: Maximum stage recorded, 3.95 feet at 11.30 a. m. July 15, 1918 (discharge, 288 second-feet); minimum flow zero on numerous dates when headgates were closed.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—None below Idaho (Government) canal crossing and above the station.

REGULATION.—The Idaho (Government) canal has been constructed directly across the channel of the creek above the station. The canal receives the entire flow of the creek as tributary and regulates the flow returned to creek channel below by means of headgates. Above this point numerous canal systems utilize the creek channel as a waste ditch.

ACCURACY.—Stage-discharge relation not permanent. Rating curve well defined for open-water conditions; parallel curve used. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table or by shifting-control method. Records fair.

Discharge measurements of Sand Creek near Firth, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 21	William Kessler	2.04	76.5	May 19	Baldwin and Newell	2.49	132
Jan. 14	G. C. Baldwin	[a] 2.42	43.0	June 19	R. B. Kilgore	.85	3.0
Mar. 3	C. F. Elford	[a] 2.12	25.2	21	do	2.35	121
13	do	[a] 2.70	48.4	29	do	3.20	204
Apr. 15	do	2.85	185	Aug. 15	G. C. Baldwin	2.33	113
16	do	2.78	179				

[a] Stage-discharge relation affected by ice.

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Daily discharge, in second-feet, of Sand Creek near Firth, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	100	63	92	68	.....	116	213	213	102	0	8
2	100	71	92	81	.....	120	209	205	113	0	11
3	98	68	94	72	25	134	219	203	112	0	12
4	81	70	90	90	.....	130	213	202	147	39	15
5	81	63	90	94	.....	120	208	194	183	183	14
6	89	81	92	81	.....	117	206	183	183	157	40
7	81	81	72	72	.....	117	203	183	112	142	132
8	89	74	72	70	.....	102	196	122	147	33	132
9	95	81	90	68	.....	126	195	109	129	8	183
10	91	83	88	.....	.....	120	191	102	249	6	172
11	89	86	68	.....	.....	135	188	0	216	112	162
12	90	86	63	.....	.....	141	187	0	222	112	162
13	93	86	90	.....	48	173	186	0	218	110	167
14	90	78	94	43	.....	185	182	0	264	102	167
15	90	81	92	.....	.....	186	175	0	288	132	162
16	89	83	90	.....	.....	178	132	2	266	184	160
17	85	86	85	.....	.....	170	132	26	216	216	122
18	72	86	85	.....	.....	153	131	40	238	205	122
19	75	100	65	.....	.....	150	131	1	183	183	102
20	72	86	67	.....	.....	152	142	1	83	174	11
21	74	91	67	.....	86	155	105	74	78	122	8
22	75	90	65	.....	88	195	102	142	65	122	8
23	75	89	67	.....	86	203	88	275	26	132	8
24	72	89	68	.....	95	236	14	282	11	129	9
25	70	88	72	.....	100	258	0	249	10	132	10
26	70	92	70	.....	100	259	122	216	10	134	14
27	76	89	70	.....	100	261	278	92	8	132	14
28	81	86	67	.....	105	263	253	127	14	112	11
29	71	88	65	.....	105	261	234	220	0	122	10
30	72	92	67	.....	112	259	225	146	0	117	10
31	63	.....	68	.....	25	.....	219	.....	0	112	.....

NOTE.—Stage-discharge relation affected by ice Jan. 10 to Mar. 20; discharge estimated from observer's notes, temperature record, and 3 current-meter measurements, as follows: Jan. 10-13, 42 second-feet; Jan. 15-31, 30 second-feet; Feb. 1-28, 26 second-feet; Mar. 1-2, 22 second-feet; Mar. 4-12, 31 second-feet; and Mar. 14-20, 65 second-feet.

Monthly discharge of Sand Creek near Firth, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	100	63	82.2	5,050
November	100	63	82.9	4,930
December	94	63	78.0	4,800
January	94	.....	45.7	2,810
February	.....	.....	26.0	1,440
March	112	.....	59.8	3,680
April	263	102	172	10,200
May	278	0	170	10,500
June	282	0	120	7,140
July	288	0	126	7,750
August	216	0	112	6,890
September	183	8	71.9	4,280
The year	288	0	96.0	69,500

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FORT HALL UPPER CANAL NEAR BLACKFOOT, IDAHO.

LOCATION.—In sec. 13, T. 3 S., R. 35 E., Bingham County, 500 feet below headgates and 3½ miles southeast of Blackfoot.

RECORDS AVAILABLE.—May 8, 1912, to September 30, 1918.

GAGE.—Vertical staff in stilling well on right bank and sloping gage painted on right side about midway of concrete rating section. Bristol water-stage recorder used during 1912 and parts of 1913 and 1914. All gages set to same datum and at practically same site. Gage read by ditch rider and gate tender.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension footbridge at gage.

CHANNEL AND CONTROL.—Concrete trapezoidal rating section.

EXTREMES OF DISCHARGE.—1912–1918: Maximum stage recorded, 4.90 feet at 7 a. m. July 14, 1918 (discharge, 431 second-feet); minimum flow occurs during winter, when a very small quantity of water is run for stock.

ICE.—Observations discontinued during winter.

DIVERSIONS.—None above station or for several miles below.

REGULATION.—Flow regulated at headgates 500 feet above.

ACCURACY.—Stage-discharge relation changed during winter. Rating curve well defined both before and after change for open-channel conditions. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Fort Hall upper canal diverts water from left bank of Blackfoot River in sec. 12, T. 3 S., R. 35 E. Water is used for irrigation on Fort Hall Indian Reservation.

Discharge measurements of Fort Hall upper canal near Blackfoot, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 22	William Kessler	0.25	0.1
May 20	T. R. Newell	3.50	264
June 16	R. B. Kilgore	4.73	410

Daily discharge, in second-feet, of Fort Hall upper canal near Blackfoot, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	May.	June.	July.	Aug	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1	121	.....	310	406	424	352	16	121	262	408	418	370	3
2	126	.....	310	404	425	352	17	126	250	408	411	322	74
3	121	.....	322	396	424	360	18	131	248	396	406	334	150
4	121	.....	316	400	424	336	19	141	256	402	406	329	178
5	121	.....	322	405	416	344	20	48	262	408	400	322	192
6	116	159	332	410	418	344	21	.....	272	411	406	324	210
7	116	174	340	416	412	334	22	.....	272	408	406	312	192
8	118	183	346	419	416	324	23	.....	284	411	408	299	163
9	98	178	352	418	394	328	24	.....	296	411	413	296	153
10	89	181	358	419	382	322	25	.....	304	412	411	310	150
11	87	172	310	418	364	300	26	.....	310	408	413	340	150
12	126	194	372	420	357	276	27	.....	308	404	418	347	178
13	111	218	380	418	348	262	28	.....	310	408	418	334	174
14	96	238	388	425	348	136	29	.....	308	411	419	346	178
15	106	244	399	420	360	5	30	.....	310	406	420	353	181
							31	.....	310	.....	424	356	.....

NOTE.—Discharge Oct. 8–10 estimated on basis of gage heights furnished by C. H. Southworth, U. S. Indian Service engineer.

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Monthly discharge of Fort Hall upper canal near Blackfoot, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-20	141	48	112	4,440
May 6-31	310	159	250	12,900
June	412	310	376	22,400
July	425	396	413	25,400
August	425	296	361	22,200
September	360	3	223	13,300

FORT HALL LOWER CANAL NEAR BLACKFOOT, IDAHO.

LOCATION.—In sec. 15, T. 3 S., R. 35 E., Bingham County, 200 feet below ford where road to headgates half a mile above crosses canal and 2½ miles southeast of Blackfoot.

RECORDS AVAILABLE.—May 15, 1912, to September 30, 1918.

GAGE.—Inclined staff on right bank near center of concrete rating station; read by ditch rider for the United States Indian Service. Bristol water-stage recorder at same site, referred to a datum 1.53 feet lower than that of staff gage, was used from 1912 to 1914.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge at gage.

CHANNEL AND CONTROL.—Channel at gage is trapezoidal concrete rating section, at sides of which sand and silt have been deposited. Principal control is a wooden check across the canal about a third of a mile below gage. Variations in amount of water carried in a large lateral that diverts between the gage and the check and the growth of moss and weeds in the canal caused several changes in the stage-discharge relation during the season.

EXTREMES OF DISCHARGE.—1912-1918: Maximum discharge, 268 second-feet August 5, 9, and 10, 1918. Canal reported dry on numerous days.

ICE.—No records obtained during winter. Small quantities of water are run at times for use of stock, but during most of the winter the headgates are closed.

DIVERSIONS.—None above gage; one large and one small lateral divert between the gage and the check that acts as the main control.

REGULATION.—Flow regulated at the headgates half a mile above gage.

ACCURACY.—Stage-discharge relation not permanent; affected by variation in quantity of water diverted immediately below gage, by variable conditions at the control, and by growth of aquatic vegetation. Standard rating curve fairly well defined; several parallel curves used. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, or by shifting-control method. Records good.

Discharge measurements of Fort Hall lower canal near Blackfoot, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	William Kessler	1.10	7.2	June 28	R. B. Kilgore	2.90	195
May 20	T. R. Newell	2.41	117	Aug. 5	G. C. Baldwin	3.28	254
June 18	R. B. Kilgore	2.83	175	Sept. 11	do	2.90	204

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Daily discharge, in second-feet, of Fort Hall lower canal near Blackfoot, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1	107	.....	156	212	232	180	16	36	108	188	189	262	149
2	107	.....	154	202	254	177	17	34	124	210	188	246	147
3	87	.....	151	218	254	180	18	30	126	175	181	202	147
4	62	.....	146	196	262	182	19	30	126	199	180	196	144
5	50	.....	134	190	261	185	20	20	118	225	178	195	146
6	50	.....	132	190	252	195	21	12	121	236	183	194	144
7	50	84	150	190	248	206	22	8	114	242	104	182	144
8	50	86	168	196	234	205	23	.....	106	255	73	171	142
9	50	86	174	198	262	206	24	.....	138	233	71	168	144
10	50	63	156	196	254	205	25	.....	151	196	68	168	127
11	50	37	115	196	250	204	26	.....	154	194	121	163	124
12	50	37	152	196	251	206	27	.....	167	196	175	137	127
13	50	41	170	202	240	204	28	.....	164	204	174	171	127
14	38	72	181	202	243	193	29	.....	162	217	196	158	124
15	36	111	192	205	248	149	30	.....	159	212	182	177	124
							31	.....	156	.....	225	182	.....

Monthly discharge of Fort Hall lower canal near Blackfoot, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-22	107	8	48	2,090
May 7-31	167	37	112	5,550
June	255	115	184	10,900
July	225	68	177	10,900
August	262	137	217	13,300
September	206	124	165	9,820

PORTNEUF RIVER AT POCATELLO, IDAHO.

LOCATION.—In sec. 27, T. 6 S., R. 34 E., 90 feet above old slaughter-house bridge at foot of Carson Street, in Pocatello, Bannock County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 31, 1911, to September 30, 1918. For station 1 mile upstream, May 18, 1897, to October 14, 1899.

GAGE.—Vertical staff on left bank just below highway bridge; read by W. S. Hutson. Gage used from 1897 to 1899 was vertical staff fastened to pier of wagon bridge one-eighth mile below plant of Pocatello Electric Light Co.

DISCHARGE MEASUREMENTS.—Made by wading or from upstream side of old slaughter-house bridge.

CHANNEL AND CONTROL.—Bed composed of rocks and boulders; shifts between narrow limits. No well-defined control. Left bank subject to overflow at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.65 feet at 8 a. m. March 28 (discharge, 579 second-feet); minimum stage recorded, 2.25 feet August 4–6, 8–10, 12, and 14 (discharge, 80 second-feet).

1911–1918: Maximum stage recorded, 7.8 feet May 30, 1917 (discharge in excess of 2,000 second-feet during period from May 13 to June 14, when left bank was overflowed); minimum stage recorded, 2.0 feet July 4, 1915 (discharge, 52 second-feet).

1897–1899: Maximum stage recorded, 12.80 feet May 18, 1897 (discharge, 1,880 second-feet); minimum stage recorded, 6.10 feet July 4–11, 13, and 17–18, 1898 (discharge, 14 second-feet).

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ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—Numerous diversions above station. The largest single diversion is canal of Portneuf-Marsh Valley Canal Co. which irrigates land near Downey.

REGULATION.—None below head of Portneuf-Marsh Valley Canal Co.'s canal. Storage reservoir of company near Chesterfield has capacity of about 28,000 acre-feet.

ACCURACY.—Stage-discharge relation shifted slightly; affected by ice during winter. Rating curves well defined. Gage read to quarter-tenths three times weekly, except during June and July when daily readings were obtained. Daily discharge ascertained by applying daily gage height to rating table and interpolating for days of no gage height. Records good.

Discharge measurements of Portneuf River at Pocatello, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 6	C. F. Elford	3.70	339
May 21	Kilgore and Baldwin	2.88	169
Sept. 11	G. C. Baldwin	2.72	142

Daily discharge, in second-feet, of Portneuf River at Pocatello, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	288	329	351	351		313	554	454	280	181	85	110
2	288	329	351	351		313	545	446	270	181	85	110
3	288	329	351	351	290	335	535	437	260	181	85	110
4	288	329	351	351		335	526	429	249	172	80	110
5	288	329	351	351		335	516	405	249	172	80	110
6	288	329	351	351	358	335	507	389	229	172	80	117
7	288	329	351	351	358	335	507	374	209	164	80	124
8	288	329	351	351	358	335	516	358	200	164	80	132
9	288	329	329	351	358	335	526	343	190	139	80	139
10	288	329	329	330	358	358	535	328	181	132	80	139
11	288	329	329	309	358	374	535	313	172	132	80	139
12	298	329	329	288	358	389	535	313	164	132	80	139
13	308	329	329		358	405	535	292	147	139	80	139
14	308	329	329		358	439	564	270	132	155	80	139
15	308	329	329		358	473	554	249	124	164	118	147
16	308	329	329	300	358	507	545	239	117	172	155	147
17	308	329	329		358	507	535	229	110	164	140	147
18	308	351	329		358	507	517	222	110	155	125	155
19	308	351	329	308	358	521	498	216	110	147	110	181
20	308	351	329	308	358	535	480	209	124	139	110	186
21	311	351	329	308	350	550	480	200	139	132	110	190
22	313	351	329	308	343	564	471	190	190	124	110	190
23	316	351	329	308	335	564	463	181	310	124	110	195
24	318	351	329	308	313	564	454	172	429	117	110	200
25	321	351	329	308	313	564	454	190	381	117	110	200
26	324	351	329	308	313	564	454	225	291	110	110	200
27	326	351	336	308	313	564	454	260	249	104	110	210
28	329	351	344	308	313	564	454	291	229	97	110	219
29	329	351	351	308	.....	564	454	291	209	97	110	239
30	329	351	351	308	.....	564	454	280	190	91	110	239
31	329	.....	351	308	.....	564	.....	280	.....	85	110	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated because of ice.

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Monthly discharge of Portneuf River at Pocatello, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	329	288	306	18,800
November	351	329	339	20,200
December	351	329	338	20,800
January	351	.....	319	19,600
February	358	.....	336	18,700
March	564	313	457	28,100
April	564	454	505	30,000
May	454	172	293	18,000
June	429	110	208	12,400
July	181	85	140	8,610
August	155	80	100	6,150
September	239	110	160	9,520
The year	564	80	291	211,000

NORTH SIDE MINIDOKA CANAL NEAR MINIDOKA, IDAHO.

LOCATION.—In sec. 1, T. 9 S., R. 25 E., 650 feet below Minidoka dam and 6 miles south of Minidoka, Minidoka County.

RECORDS AVAILABLE.—May 1, 1909, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank, 300 feet below site of gage used prior to October 31, 1914; inspected by employees of United States Reclamation Service.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge a few feet above present gage.

CHANNEL AND CONTROL.—Rock cut; practically permanent but rough.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.35 feet on April 30, May 5 and 6 (discharge, 1,500 second-feet). No flow at various times when headgates were closed.

1909–1918: Maximum stage recorded, 9.44 feet May 20, 1914 (discharge, 1,520 second-feet); no flow at various times when headgates were closed.

ICE.—Observations discontinued during winter.

DIVERSIONS.—None above station and none close enough below to affect stage-discharge relation.

REGULATION.—Flow controlled by headgates at Minidoka dam.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder excellent. Mean daily gage height obtained by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Records furnished by United States Reclamation Service.

North Side Minidoka canal diverts from the right bank of Snake River in sec. 1, T. 9 S., R. 25 E. Water is used for irrigating the North Side Minidoka project of the United States Reclamation Service. Project has about 20 miles of main canal and about 260 miles of laterals.

Discharge measurements of North Side Minidoka canal near Minidoka, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 19	Hugh Crawford	7.40	1,030	Aug. 17	Crawford and Anderson	7.95	1,140
30	Crawford and Anderson	9.30	1,500	Sept. 17	.....do	6.06	711
June 29	.....do	8.33	1,260	27	E. P. Anderson	6.05	693
July 13	.....do	9.30	1,490				

NOTE.—Measurements made by employees of U. S. Reclamation Service.

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Daily discharge, in second-feet, of North Side Minidoka canal near Minidoka, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	557	.....	215	1,490	1,490	1,250	1,490	1,340
2	540	.....	215	1,490	1,490	1,340	1,490	1,360
3	514	.....	256	1,490	1,490	1,370	1,480	1,340
4	523	.....	455	1,490	1,490	1,370	1,480	1,330
5	532	.....	575	1,500	1,490	1,410	1,340	1,340
6	523	.....	575	1,500	1,490	1,480	1,290	1,340
7	523	.....	575	1,490	1,490	1,490	1,290	1,340
8	506	.....	584	1,490	1,490	1,490	1,300	1,360
9	322	.....	647	1,490	1,490	1,490	1,140	1,280
10	.....	.....	723	1,490	1,490	1,490	1,080	1,020
11	.....	.....	879	1,490	1,480	1,490	1,080	970
12	.....	.....	1,030	1,490	1,490	1,490	1,080	958
13	.....	.....	1,020	1,490	1,490	1,490	1,160	970
14	.....	.....	1,020	1,490	1,490	1,490	1,180	804
15	.....	.....	1,030	1,490	1,490	1,490	1,160	723
16	.....	.....	1,020	1,490	1,490	1,490	1,150	714
17	.....	.....	1,020	1,490	1,490	1,490	1,150	714
18	.....	.....	1,020	1,490	1,490	1,480	1,200	714
19	.....	.....	1,000	1,490	1,490	1,490	1,210	723
20	.....	.....	1,000	1,490	1,490	1,490	1,200	714
21	.....	.....	1,000	1,490	1,490	1,490	1,210	723
22	.....	.....	1,080	1,490	1,490	1,490	1,200	723
23	.....	.....	1,150	1,490	1,490	1,490	1,210	714
24	.....	.....	1,150	1,480	1,460	1,490	1,200	723
25	.....	.....	1,230	1,490	1,320	1,490	1,210	723
26	.....	.....	1,320	1,490	1,150	1,480	1,200	714
27	.....	.....	1,370	1,490	1,150	1,410	1,200	714
28	.....	.....	1,450	1,490	1,200	1,340	1,230	714
29	.....	134	1,490	1,490	1,230	1,360	1,270	694
30	.....	215	1,500	1,480	1,210	1,360	1,320	685
31	.....	215	.....	1,460	.....	1,380	1,360	.....

Monthly discharge of North Side Minidoka canal near Minidoka, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-9	557	322	504	9,000
March 29-31	215	134	188	1,120
April	1,500	215	920	54,700
May	1,500	1,460	1,490	91,600
June	1,490	1,150	1,430	85,100
July	1,490	1,250	1,450	89,200
August	1,490	1,080	1,240	76,200
September	1,360	685	939	55,900

SOUTH SIDE MINIDOKA CANAL NEAR MINIDOKA, IDAHO.

LOCATION.—In sec. 12, T. 9 S., R. 25 E., Cassia County, 300 yards below headgates at Minidoka dam and 6 miles south of Minidoka.

RECORDS AVAILABLE.—April 21, 1909, to September 30, 1918.

GAGE.—Friez water-stage recorder on right bank; inspected by employees of United States Reclamation Service. Prior to irrigation season of 1910 gage was 200 or 300 feet upstream. Datum unchanged since spring of 1910.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge a few feet above gage.

CHANNEL AND CONTROL.—Canal section is in earth; may shift. Stage-discharge relation affected by growth of aquatic plants.

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EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.60 feet July 21 and 22 (discharge, 1,060 second-feet); probably no flow during period of no record.

1909–1918: Maximum discharge, 1,060 second-feet July 21 and 22, 1918; minimum discharge as above stated.

ICE.—No records obtained during winter.

DIVERSIONS.—None above gage.

REGULATION.—Flow controlled by headgates at Minidoka dam.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined; several parallel curves used. Operation of water-stage recorder satisfactory. Mean daily gage height obtained by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table or by shifting-control method. Records good.

South Side Minidoka canal diverts from the left bank of Snake River in sec. 1, T. 9 S., R. 25 E. Water is used for irrigating the South Side Minidoka project of the United States Reclamation Service. Project has about 13 miles of main canal and about 20 miles of laterals.

Discharge measurements of South Side Minidoka canal near Minidoka, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 20	Hugh Crawford	1.82	211	Aug. 9	Crawford and Anderson	5.36	922
May 3	Crawford and Anderson	4.63	792	22	.....do	4.71	732
June 29	.....do	4.70	796	Sept. 17	.....do	3.98	524
July 13	.....do	5.54	1,030	27	E. P. Anderson	3.88	532
20	.....do	5.59	1,080				

NOTE.—Measurements made by employees of U. S. Reclamation Service.

Daily discharge, in second-feet, of South Side Minidoka canal near Minidoka, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	409	.....	574	877	794	992	939
2	399	.....	661	877	807	989	939
3	386	.....	780	919	948	986	951
4	378	.....	849	934	977	980	951
5	371	.....	891	962	962	948	951
6	378	.....	934	992	977	931	962
7	380	.....	962	1,010	992	925	962
8	386	.....	962	1,020	1,010	922	931
9	388	.....	934	1,020	1,020	919	888
10	386	.....	934	1,040	1,040	902	815
11	384	.....	934	1,040	1,040	874	802
12	382	.....	919	1,050	1,040	846	775
13	380	.....	905	1,050	1,040	846	695
14	375	.....	877	1,050	1,040	843	603
15	369	.....	821	1,040	1,040	843	591
16	366	.....	835	1,010	1,040	829	567
17	360	.....	835	1,020	1,050	802	541
18	353	.....	821	1,020	1,050	785	532
19	351	.....	753	1,020	1,050	718	536
20	344	210	753	1,010	1,050	679	527
21	.....	210	740	992	1,060	745	529
22	.....	208	753	992	1,060	729	532
23	.....	207	821	977	1,050	740	525
24	.....	210	835	934	1,050	740	527
25	.....	224	835	934	1,050	740	529
26	.....	280	835	919	530	764	522
27	.....	294	821	877	824	804	502
28	.....	313	766	863	992	860	429
29	.....	353	794	807	1,000	885	401
30	.....	429	821	807	997	913	384
31	.....	.....	877	.....	994	928	.....

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Monthly discharge of South Side Minidoka canal near Minidoka, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1–20	409	344	376	14,900
April 20–30	429	207	267	5,830
May	962	574	833	51,200
June	1,050	807	969	57,700
July	1,060	530	986	60,600
August	992	679	852	52,400
September	962	384	678	40,300

NORTH SIDE TWIN FALLS CANAL AT MILNER, IDAHO.

LOCATION.—In sec. 20, T. 10 S., R. 21 E., Jerome County, at highway bridge half a mile north of Milner post office and three-fourths mile below headgates at Milner dam.

RECORDS AVAILABLE.—May 10, 1909, to September 30, 1918.

GAGE.—Vertical staff attached to downstream side of bridge near left bank; read by F. W. Deming October 1, 1917, to March 31, 1918; from April 1, 1918, Stevens 8-day water-stage recorder at slightly different site and datum. Datum of bridge gage unchanged since establishment of station. A slide gage installed on bridge in 1911 and set to read same as staff gage was discontinued in 1913. A Lietz water-stage recorder which was installed in 1912 in a shelter over the staff gage, never operated entirely satisfactorily and was abandoned in 1913. New datum used after April 1, 1918.

DISCHARGE MEASUREMENTS.—Made from cable 150 feet below gage.

CHANNEL AND CONTROL.—Channel is a permanent concrete-lined section. Moss growth is heavy during summer and stage-discharge relation is seriously affected. Control apparently indeterminate.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 8.34 feet at 8 p. m. July 16 (discharge, 2,970 second-feet); canal dry October 21 to November 5, and for a few hours on other days.

1909–1918: Maximum and minimum stages as noted above.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None between gage and headgates and none for some distance below. Surplus water may be discharged into river through waste gates about 200 feet below head of canal.

REGULATION.—Flow regulated by head and waste gates.

ACCURACY.—Stage-discharge relation not permanent, changes being due largely to growth of aquatic plants. Standard rating curve well defined; several parallel curves used. Staff gage read to half-tenths once daily October 1 to March 31; September 8–13 and 22–30; operation of water-stage recorder satisfactory for remainder of year. Daily discharge ascertained by applying to rating table mean daily gage height obtained from staff reading or by inspecting recorder graph. Discharge also ascertained by shifting-control method. Records for periods in which water-stage recorder operated, excellent; other records fair.

COOPERATION.—Some discharge measurements furnished by State engineer of Idaho. Gage-height record and some measurements furnished by Twin Falls North Side Land & Water Co.

The North Side Twin Falls canal diverts water from the north side of Snake River at the Milner dam and furnishes water for stock and irrigation for about 240,000 acres in Minidoka, Lincoln, and Gooding counties. The distribution system comprises about 100 miles of main canal and 625 miles of laterals.

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Discharge measurements of North Side Twin Falls canal at Milner, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 11	Finkelnburg and McConnel	5.32	1,560	July 9	Crandall and Adams	8.23	2,920
29	E. A. Finkelnburg	7.43	2,410	24	R. M. Adams	8.21	2,890
May 15	Burdick and McConnel	7.95	2,530	30	Baldwin and McConnel	7.79	2,680
16	L. T. Burdick	7.96	2,520	Aug. 12	R. M. Adams	8.25	2,920
17	McConnel and Burdick	7.97	2,720	19	McConnel and Adams	8.02	2,810
29	L. T. Burdick	7.90	2,380	19	do	8.03	2,800
30	Crandall and Burdick	8.02	2,400	Sept. 19	R. M. Adams	8.22	2,630
June 1	do	8.11	2,850	27	Baldwin and McConnel	7.11	2,160
8	L. T. Burdick	7.90	2,740	27	do	7.14	2,140
19	do	8.19	2,750				

NOTE.—Finkelnburg, Burdick, Crandall, and Adams, employees of Twin Falls North Side Land & Water Co. McConnel employee of State of Idaho.

Daily discharge, in second-feet, of North Side Twin Falls canal at Milner, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	291	0	291	811	548	480	1,300	2,500	712	2,870	2,900	2,570
2	353	0	291	811	517	480	1,220	2,590	2,870	2,870	2,950	2,560
3	376	0	291	811	487	480	810	2,510	2,820	2,870	2,920	2,550
4	376	0	291	811	456	480	497	1,920	2,800	2,900	2,920	2,540
5	311	0	291	811	426	480	512	2,590	2,750	2,900	2,920	2,530
6	332	291	291	811	453	480	630	2,610	2,750	2,900	2,900	2,490
7	311	480	291	597	453	480	1,290	2,570	2,750	2,900	2,920	2,510
8	311	700	291	597	200	480	1,500	2,560	2,750	2,900	2,920	2,500
9	291	700	291	597	664	480	1,530	2,560	2,750	2,900	2,920	2,510
10	291	597	291	400	597	480	1,530	2,520	2,750	2,900	2,900	2,500
11	353	700	291	537	597	480	1,550	2,540	2,750	2,900	2,900	2,470
12	353	737	291	597	597	480	1,540	2,500	2,750	2,920	2,920	2,460
13	353	700	291	480	538	480	1,510	2,490	2,720	2,920	2,920	2,450
14	353	962	291	480	480	630	1,570	2,510	2,720	2,920	2,920	2,440
15	353	962	291	480	480	664	1,600	2,520	2,720	2,920	2,920	2,480
16	353	737	291	538	480	664	1,580	2,550	2,820	2,950	2,920	2,540
17	353	291	291	597	480	664	1,640	2,520	2,870	2,950	2,870	2,470
18	353	291	291	597	480	664	1,810	2,510	2,900	2,920	2,850	2,340
19	353	291	291	597	480	664	1,830	2,480	2,900	2,920	2,850	2,490
20	353	291	291	582	480	664	1,820	2,440	2,900	2,920	2,820	2,540
21	0	272	291	567	480	664	1,740	2,430	2,900	2,920	2,140	2,540
22	0	291	291	552	480	664	1,970	2,390	2,900	2,920	2,800	2,470
23	0	291	291	537	480	932	2,200	2,400	2,900	2,920	2,800	2,320
24	0	291	291	537	480	1,200	2,290	2,390	2,900	2,900	2,770	2,370
25	0	291	291	737	480	1,200	2,360	2,410	2,870	2,920	2,760	2,190
26	0	291	291	700	480	1,160	2,430	2,420	2,900	2,920	2,730	2,170
27	0	291	886	700	480	1,370	2,520	2,410	2,900	2,900	2,690	2,170
28	0	291	962	670	480	1,460	2,380	2,370	2,870	2,800	2,680	2,120
29	0	291	962	639	.....	1,500	2,350	2,410	2,900	2,670	2,650	2,000
30	0	291	962	609	.....	1,500	2,390	2,410	2,870	2,720	2,640	2,000
31	0	.....	811	578	.....	1,400	.....	602	.....	2,770	2,600	.....

NOTE.—Period Oct. 21 to Nov. 5 estimated at zero discharge. Discharge interpolated Jan. 16. 20-22, 24, Jan. 28 to Feb. 4, Feb. 13, Mar. 18, 23, and 31.

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Monthly discharge of North Side Twin Falls canal at Milner, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	376	0	218	13,400
November	962	0	387	23,000
December	962	291	392	24,100
January	811	400	628	38,600
February	664	200	490	27,200
March	1,500	480	771	47,400
April	2,520	497	1,660	98,800
May	2,610	602	2,410	148,000
June	2,900	712	2,760	164,000
July	2,950	2,670	2,890	178,000
August	2,950	2,140	2,820	173,000
September	2,570	2,000	2,410	143,000
The year	2,950	0	1,490	1,080,000

SOUTH SIDE TWIN FALLS CANAL AT MILNER, IDAHO.

LOCATION.—In sec. 29, T. 10 S., R. 21 E., at wagon bridge one-eighth of a mile below headgates at Milner, in Twin Falls County.

RECORDS AVAILABLE.—May 10, 1909, to September 30, 1918.

GAGE.—Vertical staff in two sections, read by F. W. Deming and W. N. McConnel. The main or upper section of the gage is on the left bank of the canal about 100 feet upstream from the highway bridge, to the lower side of which the low-water section is fastened. This low-water section is the original gage, but on account of the difficulty in making readings accurately at high stage, the high-water section was installed early in the summer of 1912 and has since been used exclusively for stages above 5.3 feet. The two sections read practically the same, although the datum of the upstream section is about 0.1 foot higher than the other. A Friez water-stage recorder is installed opposite the upper staff gage; used April 5 to September 30, 1918.

DISCHARGE MEASUREMENTS.—Made from highway bridge and suspension bridge 150 feet upstream; also from cable.

CHANNEL AND CONTROL.—Channel at gage is blasted out of rock; practically permanent. Occasional slight changes in control are due to washing in and deposition of silt.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 4,600 second-feet August 12; minimum stage, 2.00 feet February 12 (discharge, 120 second-feet).

1909–1918: Maximum discharge as noted above; minimum stage recorded, 0.8 foot April 7, 1913 (discharge, 11 second-feet).

ICE.—Stage-discharge relation seldom affected by ice; open channel rating curve used throughout the year. Because of the close proximity of the gaging-station to the headgates, ice never forms in the immediate vicinity of the gage but has been known to form to a sufficient extent farther down the canal to affect stage-discharge relation.

DIVERSIONS.—None above gage and none of consequence for several miles below.

REGULATION.—Flow regulated by headgates.

ACCURACY.—Stage-discharge relation considered permanent throughout year. Rating curve well defined. Gage read daily to tenths October 1 to April 4; operation of water-stage recorder satisfactory from April 5 to September 30. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph or from staff gage reading. Records October to April 4, fair; for rest of year, good.

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COOPERATION.—Gage-height record and part of the discharge measurements furnished by the Twin Falls Canal Co. and by the State engineer of Idaho.

The South Side Twin Falls canal diverts water from the south side of Snake River at the Milner dam. This canal furnishes water for stock and for irrigation of about 200,000 acres near Twin Falls. The distribution system comprises about 110 miles of main canal and 590 miles of laterals.

Discharge measurements of South Side Twin Falls canal at Milner, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Sept. 6	W. N. McConnel	9.44	3,060
26	G. C. Baldwin	8.05	2,090
27	Baldwin and McConnel	6.12	1,270

NOTE.—W. N. McConnel, an employee of the State of Idaho.

Daily discharge, in second-feet, of South Side Twin Falls canal at Milner, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,990	1,350	572	629	629	517	1,330	3,220	3,460	3,560	3,560	3,060
2	2,040	1,350	572	629	877	517	1,500	3,280	3,430	3,490	3,650	3,030
3	2,140	1,350	572	629	629	517	1,700	3,190	3,430	3,460	3,680	3,370
4	2,650	1,350	572	629	629	517	1,560	3,370	3,460	3,520	3,620	3,250
5	2,710	1,350	572	629	1,050	517	1,410	3,490	3,430	3,590	3,340	3,220
6	1,470	1,350	572	629	1,050	572	1,410	3,560	3,430	3,620	3,220	2,940
7	1,520	1,350	572	572	718	572	1,370	3,590	3,520	3,090	3,220	3,090
8	1,600	1,350	572	572	718	517	1,410	3,620	3,590	3,150	3,250	3,160
9	1,310	1,350	572	572	230	364	1,500	2,420	3,590	3,620	3,370	3,280
10	1,890	1,350	877	572	317	364	1,500	2,650	3,590	3,560	3,430	3,190
11	2,140	1,350	877	572	153	364	1,540	3,430	3,590	3,560	3,900	3,120
12	1,890	1,350	877	572	120	364	1,840	3,430	3,590	3,560	4,600	3,000
13	1,890	944	877	629	464	572	1,940	3,430	3,590	3,560	4,300	3,650
14	1,230	944	877	629	517	718	1,990	2,590	3,590	3,560	3,870	4,150
15	1,430	944	877	629	517	718	2,010	2,090	3,590	3,560	3,400	3,520
16	1,430	944	877	572	517	718	1,990	3,430	3,590	3,590	3,340	3,250
17	1,430	944	877	517	517	.....	1,960	3,430	3,590	3,560	3,280	2,830
18	1,230	877	877	517	517	.....	1,990	3,490	3,590	3,590	3,280	2,500
19	1,230	877	718	464	517	.....	1,940	3,490	3,590	3,590	3,280	3,060
20	1,230	877	718	464	517	.....	1,990	3,490	3,590	3,620	3,120	3,400
21	438	718	718	572	517	.....	1,890	3,520	3,590	3,620	3,000	2,760
22	1,430	718	718	877	517	.....	1,910	3,460	3,590	3,620	3,000	2,470
23	1,430	718	718	877	517	.....	2,280	3,430	3,400	3,590	3,000	2,280
24	1,430	572	718	877	517	877	2,470	3,430	3,520	3,560	3,500	2,170
25	1,430	572	877	544	658	1,080	2,500	3,520	3,490	3,680	3,450	2,500
26	1,430	572	877	517	517	1,350	2,650	3,520	3,430	3,620	3,650	2,360
27	1,350	572	572	572	517	1,350	2,790	3,520	3,560	3,340	3,400	1,960
28	1,350	572	572	572	517	1,050	2,820	3,460	3,560	3,310	3,550	2,300
29	1,350	572	572	572	.....	1,050	3,060	3,430	3,620	3,250	3,450	2,420
30	1,350	572	572	572	.....	1,050	3,120	3,430	3,560	3,250	3,510	2,500
31	1,350	.....	629	572	.....	.....	.....	3,430	.....	3,310	3,090	.....

NOTE.—Data insufficient to warrant an estimate during the period Mar. 17-23. Waste gate below gage open all or part of Aug. 11-14; 24-30 and Sept. 13-14; discharge estimated from available data. Waste gate open June 20-22 but data too meager to estimate total discharge past gage; therefore quantity passing on down canal estimated.

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Monthly discharge of South Side Twin Falls canal at Milner, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2,710	438	1,570	96,500
November	1,350	572	990	58,900
December	877	572	710	43,700
January	877	464	605	37,200
February	1,050	120	553	30,700
April	3,120	1,330	1,980	118,000
May	3,620	2,090	3,320	204,000
June	3,620	3,400	3,540	211,000
July	3,680	3,090	3,500	215,000
August	4,600	3,000	3,460	213,000
September	4,150	1,960	2,930	174,000

BIG WOOD RIVER AT HAILEY, IDAHO.

LOCATION.—In sec. 9, T. 2 N., R. 18 E., at steel highway bridge a quarter of a mile southwest of Hailey, Blaine County.

DRAINAGE AREA.—640 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 11, 1915, to September 30, 1918.

GAGE.—Vertical staff in two sections; high-water section on left bank attached to bridge pier and low-water section at different datum directly opposite on right bank; all readings are corrected to datum of high-water section. Prior to April 3, 1917, an inverted stadia board spiked to pile near left abutment of bridge was used. Zero gage height on vertical staff at gage height 6 feet on inverted stadia board gage. Gage read by employee of Idaho Irrigation Co.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Channel fairly straight above and below station. Banks covered with light brush; subject to overflow at high stages when river may flow in from one to three channels, the number depending on the stage. Bed composed of coarse gravel and sand; clean. Low-water control formed by sheet piling used to protect a water main that crosses the river; high-water control subject to shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1917, 4.80 feet June 17 (discharge, 3,450 second-feet); minimum discharge probably somewhat less than 2 second-feet during period December 24 to January 31, when practically entire flow of river was diverted through Big Wood Slough by power plant above.

Maximum stage recorded during year ending September 30, 1918, 4.4 feet June 13 and 14 (discharge, 2,630 second-feet); minimum stage, −0.16 foot December 4-8, 10, and 11 (discharge, 10 second-feet).

1915–1918: Maximum stage recorded, 4.8 feet June 17, 1917 (discharge, 3,450 second-feet): minimum discharge probably somewhat less than 2 second-feet during period December 24, 1916, to January 31, 1917, when practically entire flow of river was diverted through Big Wood Slough by power plant above.

ICE.—Stage-discharge relation slightly affected by ice at times.

DIVERSIONS.—Only a few small diversions for irrigation are made above station. Hailey power plant, half a mile upstream, utilizes as a tailrace a natural channel on east side of river known as Big Wood Slough. A large amount of water is diverted from the main stream in this manner and is returned to river below the station. Records of the flow of Big Wood Slough have been obtained (see p. 120), and the total flow of Big Wood River is represented by the amount of water passing both stations (pp. 108 and 109).

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REGULATION.—Variation in the amount of water used at Hailey power plant causes some diurnal fluctuation at gage, but as observations on the river and on Big Wood Slough are practically simultaneous each day, the effect of such regulation is probably eliminated.

ACCURACY.—Stage-discharge relation not permanent; affected by ice January 12 to February 5, 1918. Three rating curves used. Curve used October 1, 1916, to April 3, 1917, well defined; was used direct. Curve used April 4 to May 13, 1917, well defined; was used direct April 4–25. Curve used May 18, 1917, to September 30, 1918, well defined between 25 and 3,000 second-feet; was used direct June 9, July 7–21, 1917, August 14, 1917, to January 11, 1918, and June 11 to September 30, 1918. Indirect method for shifting control used for all periods for which rating curves were not used direct, except for periods indicated in footnote to tables of daily discharge. Gage read to hundredths once daily; gage-height record unsatisfactory for winter of 1916–17. Daily discharge ascertained by applying daily gage height to rating table for periods for which shifting-control method was not used, except for periods during which stage-discharge relation was affected by ice, for which it was ascertained by means of gage heights, weather records, and comparison with flow of Big Wood Slough, and except as indicated in footnote to tables of daily discharge. Records fair prior to April 1, 1918; good thereafter.

COOPERATION.—Gage-height record and several discharge measurements furnished by Idaho Irrigation Co. Discharge measurements also furnished by Idaho State engineer.

Discharge measurements of Big Wood River at Hailey, Idaho, during the years ending Sept. 30, 1917 and 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1917.		*Feet.*	*Sec.-ft.*	1917.		*Feet.*	*Sec.-ft.*
May 11	Crosby and McConnel	3.23	1,150	Aug. 28	H. Armstrong	1.29	227
19	Lothrop Crosby[e]	3.44	1,520	Sept. 5	do	([a])	32.6
30	Atkinson[f] and McConnel[f]	3.89	1,910	14	do	[b]4.71 [c].25	30.0
June 2	Lothrop Crosby	3.77	1,800				
8	do	3.73	1,760	1918.			
9	do	4.30	2,500	Apr. 22	Armstrong and Chapman	2.12	558
18	F. M. Atkinson	4.40	3,230	May 1	S. H. Chapman[f]	2.43	825
20	Lothrop Crosby	4.32	2,820	15	do	2.57	892
26	Armstrong and Crosby	3.68	2,150	June 11	do	4.35	2,570
July 7	H. Armstrong[e]	3.57	1,710	July 6	do	1.93	534
16	do	2.59	974	9	Lothrop Crosby	1.86	500
21	do	2.35	795	10	S. H. Chapman	1.83	469
30	do	1.86	564	17	Carrol[e] and Chapman	1.59	336
30	F. M. Atkinson	1.84	545	Aug. 3	S. H. Chapman	1.04	148
Aug. 7	H. Armstrong	1.56	371	7	do	.75	90
14	F. M. Atkinson	1.16	184	12	do	[d].39	43.0
16	H. Armstrong	1.17	210	Sept. 16	Mathews[e]	1.27	213
21	do	1.16	193				

[a] Water surface below gage.
[b] Reading from temporary low-water gage installed Sept. 14, 1917.
[c] Corrected to agree with datum of present gage.
[d] Reading from temporary gage at same datum as present gage.
[e] Employee of Idaho Irrigation Co.
[f] Employee of Idaho State engineer.

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Daily discharge, in second-feet, of Big Wood River at Hailey, Idaho, for the years ending Sept. 30, 1917 and 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1916–17.												
1	183	183	169				50	334	1,750	1,840	625	
2	183	183	174				69	183	1,750	1,840	625	
3	188	183	197				69	192	1,750	1,840	594	40
4	183	183	188				60	236	1,670	1,840	503	
5	183	178	188				63	231	1,590	1,750	422	33
6	183	178	95				63	242	1,510	1,590	397	
7	216	178	89				63	387	1,670	1,590	374	
8	216	178	63				66	818	1,840	1,590	350	
9	212	178	58				69	948	2,630	1,510	291	
10	212	174	5				92	1,040	3,030	1,430	271	32
11	268	169					92	1,140	2,500	1,270	230	
12	257	156	95			5	95	1,300	2,160	1,270	206	
13	226	160	169				95	1,360	1,940	1,200	199	
14	226	160	129				95	2,070	1,750	1,120	193	30
15	226	156	118		3		95	2,690	2,160	1,040	190	
16	221	151	146	2			95	2,440	3,030	970	187	
17	221	146					95	1,750	3,450	900	187	30
18	207	146					95	1,590	3,030	900	216	
19	197	169					58	1,510	2,900	900	196	
20	183	160	4				95	1,510	2,760	900	216	
21	183	156					89	1,510	2,760	900	216	30
22	183	174					95	1,510	2,760	760	178	30
23	183	174					118	1,670	2,380	760	166	30
24	183	174					160	1,840	2,380	760	166	47
25	183	174				8	216	1,750	2,260	726	153	59
26	183	174				8	300	1,750	2,160	726	140	59
27	183	174	2			36	340	1,750	2,160	625	129	59
28	183	174				63	306	1,750	2,160	625	118	47
29	183	174			.....	63	306	1,940	2,260	625	107	30
30	188	160			.....	66	295	1,940	2,040	625	75	30
31	183	.....			.....	66	.....	1,940	.....	625		
1917–18.												
1	30	47	42	210		150	374	795	795	726	136	156
2	30	47	28	199		150	374	900	903	691	145	156
3	30	47	14	190	140	150	287	970	1,010	625	166	156
4	24	47	10	206		163	287	1,120	1,120	578	156	150
5	24	47	10	199		163	263	1,270	1,120	532	145	145
6	24	47	10	184	163	138	287	1,270	1,350	532	136	143
7	24	47	10	196	138	143	287	1,200	1,430	476	96	143
8	24	47	10	178	163	148	303	1,200	1,590	448	87	156
9	24	47	14	178	138	153	374	1,120	1,750	503	82	199
10	24	47	10	127	163	158	398	970	2,160	476	59	199
11	24	47	10	127	163	163	422	865	2,380	448	43	193
12	24	47	12		163	156	422	830	2,380	422	44	190
13	24	47	14		163	150	476	865	2,630	397	38	193
14	24	178	116		138	138	462	900	2,630	448	34	206
15	24	193	116		116	138	448	970	2,260	562	39	241
16	24	193	163		138	138	422	865	1,940	476	41	220
17	24	193	210		163	150	397	865	1,750	350	41	213
18	19	178	210		150	163	374	795	1,750	328	89	178
19	127	178	210		127	175	397	726	1,670	299	70	169
20	210	178	210		138	178	422	691	1,630	291	64	166
21	107	38	193	166	138	181	476	691	1,590	260	64	190
22	107	47	210		138	193	594	691	1,670	210	64	190
23	89	47	203		156	190	658	726	1,750	196	62	199
24	89	47	206		150	216	658	726	1,590	193	59	203
25	59	47	196		138	241	691	726	1,350	196	54	203
26	59	47	210		163	241	658	760	1,090	193	30	196
27	59	47	216		138	274	626	760	830	172	29	196
28	59	38	223		127	307	594	726	812	163	24	196
29	47	38	210		.....	307	625	726	795	161	24	193
30	59	42	216		.....	350	726	760	760	156	22	223
31	53	.....	213		.....	397	.....	79[illegible]	.....	140	156	.....

NOTE.—Practically entire flow of river diverted through Pig Wood Slough December 17, 1916, to March 24, 1917; estimated discharge represents leakage through diversion dam. Water surface below gage August 30 to September 20, 1917, discharge estimated by means of two discharge measurements. Discharge interpolated on account of missing gage readings, Nov. 26, 1916: Nov. 25, Dec. 2, 16, 1917; Feb. 21, March 7–10, 12, 17, 20, 24, 27, Apr. 10, 14, 27, May 4, 21, 30, June 2, 3, 8, 20, 22, 26, 28, and July 4, 1918. Braced figures show mean discharge for periods indicated.

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Monthly discharge of Big Wood River at Hailey, Idaho, for the years ending Sept. 30, 1917 and 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	268	183	200	12,300
November	183	146	169	10,100
December	197	.....	62.3	3,830
January	.....	.....	2.0	123
February	.....	.....	3.0	167
March	66	.....	13.9	855
April	340	50	127	7,560
May	2,690	183	1,330	81,800
June	3,450	1,510	2,270	135,000
July	1,840	625	1,130	69,500
August	625	.....	258	15,900
September	59	.....	36.0	2,140
The year	3,450	.....	469	339,000
1917–18.				
October	210	19	50.6	3,110
November	193	38	78.0	4,640
December	223	10	120	7,380
January	210	.....	164	10,100
February	163	.....	145	8,050
March	397	138	192	11,800
April	726	263	459	27,300
May	1,270	691	880	54,100
June	2,630	760	1,550	92,200
July	726	140	376	23,100
August	166	22	74.2	4,560
September	241	143	185	11,000
The year	2,630	10	356	257,000

Combined daily discharge, in second-feet, of Big Wood River and Big Wood Slough at Hailey, Idaho, for the years ending Sept. 30, 1917 and 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1916–17.												
1	197	203	172	176	138	151	116	394	1,900	1,860	630	210
2	197	203	177	176	168	142	147	377	1,910	1,860	630	194
3	202	203	200	196	168	142	139	396	1,910	1,850	600	202
4	197	203	191	176	168	170	123	440	1,830	1,860	509	194
5	197	199	191	176	168	170	139	435	1,740	1,770	428	187
6	197	198	135	176	168	170	141	486	1,660	1,600	406	186
7	231	198	120	176	168	170	141	631	1,840	1,600	386	186
8	231	198	88	176	168	170	146	942	2,000	1,620	365	179
9	227	203	82	176	168	170	149	1,070	2,800	1,520	352	179
10	227	201	142	167	168	170	199	1,200	3,200	1,440	355	186
11	283	193	170	167	168	151	199	1,300	2,630	1,290	301	186
12	275	175	205	176	168	133	203	1,480	2,290	1,290	262	186
13	243	175	175	132	168	142	205	1,540	2,070	1,220	295	194
14	243	169	133	132	168	161	205	2,220	1,900	1,140	289	200
15	243	159	122	132	168	170	205	2,860	2,310	1,050	286	192
16	238	154	150	132	168	151	193	2,620	3,180	977	282	184
17	238	149	194	132	168	142	173	1,940	3,580	906	289	192
18	227	167	188	132	168	142	181	1,620	3,180	906	333	177
19	217	173	188	148	168	142	184	1,530	3,050	906	306	192
20	203	164	169	186	149	151	188	1,530	2,880	905	318	192
21	203	159	169	167	168	112	215	1,530	2,890	905	318	184
22	203	177	169	152	168	89	223	1,530	2,880	765	266	192
23	203	177	178	148	168	103	264	1,690	2,470	765	268	207
24	203	177	186	148	168	107	325	1,860	2,530	765	268	217
25	203	177	186	176	187	110	400	1,770	2,390	731	259	221
26	204	177	186	176	149	89	360	1,770	2,280	731	251	221
27	204	177	172	167	168	138	414	1,770	2,180	630	245	221
28	204	177	167	167	131	135	365	1,920	2,180	630	235	209
29	204	177	152	167	.....	141	365	2,100	2,270	630	231	192
30	207	163	152	167	.....	144	355	2,100	2,060	630	245	192
31	202	.....	158	142	.....	144	.....	2,100	.....	630	245	.....

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Combined daily discharge, in second-feet, of Big Wood River and Big Wood Slough at Hailey, Idaho, for the years ending Sept. 30, 1917 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917–18.												
1	192	179	204	213	142	159	387	804	803	735	280	174
2	192	179	182	202	143	160	386	912	914	701	289	180
3	192	179	161	193	143	160	296	985	1,020	635	322	180
4	178	179	157	209	143	173	296	1,140	1,140	588	306	176
5	178	187	164	202	143	173	271	1,290	1,140	542	289	171
6	171	187	164	187	183	145	296	1,290	1,370	542	280	169
7	171	179	157	199	155	151	296	1,210	1,450	490	265	168
8	171	179	157	181	174	156	312	1,210	1,610	465	256	182
9	171	179	161	181	146	162	381	1,130	1,770	522	251	220
10	171	187	157	129	174	167	406	977	2,200	497	228	224
11	171	179	157	129	173	173	431	871	2,430	475	226	219
12	171	179	159	157	173	166	431	836	2,430	449	213	214
13	171	179	161	157	173	160	485	871	2,700	425	207	217
14	178	197	201	157	145	147	471	907	2,690	462	203	229
15	171	212	198	157	122	147	457	980	2,290	578	236	265
16	178	210	205	157	148	147	431	871	1,960	493	238	242
17	178	210	212	158	174	161	405	870	1,760	452	238	233
18	181	195	213	158	160	175	382	800	1,770	446	157	225
19	241	197	213	158	134	187	405	731	1,690	419	226	218
20	321	193	213	158	146	191	430	696	1,650	415	233	213
21	215	170	196	158	146	195	485	696	1,610	380	233	209
22	212	179	213	157	146	209	604	695	1,700	366	233	210
23	203	171	206	158	166	206	669	731	1,780	340	231	220
24	203	171	209	158	158	234	669	731	1,620	337	215	223
25	191	171	199	158	145	260	702	731	1,370	340	210	223
26	199	171	213	158	173	260	668	766	1,110	333	213	215
27	199	209	219	158	146	288	635	765	850	312	212	214
28	199	200	226	157	134	317	603	731	828	303	207	214
29	179	200	213	159	.....	315	634	731	806	301	207	210
30	199	204	219	158	.....	358	736	766	770	291	205	243
31	193	.....	216	157	.....	410	.....	803	.....	280	179	.....

Combined monthly discharge of Big Wood River and Big Wood Slough at Hailey, Idaho, for the years ending Sept. 30, 1917 and 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	283	197	218	13,400
November	203	149	181	10,800
December	205	82	163	10,000
January	196	132	162	9,960
February	187	131	165	9,160
March	170	89	143	8,790
April	414	116	222	13,200
May	2,860	377	1,460	89,800
June	3,580	1,660	2,400	143,000
July	1,860	630	1,140	70,100
August	630	231	337	20,700
September	221	177	195	11,600
The year	3,580	82	566	410,000
1917–18.				
October	321	171	192	11,800
November	212	170	187	11,100
December	226	157	191	11,700
January	213	129	167	10,300
February	183	122	154	8,550
March	410	145	204	12,500
April	736	271	469	27,900
May	1,290	696	888	54,600
June	2,700	770	1,570	93,400
July	735	280	449	27,600
August	322	157	235	14,400
September	265	168	210	12,500
The year	2,700	122	410	296,000

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BIG WOOD RIVER NEAR BELLEVUE, IDAHO.

LOCATION.—In sec. 20, T. 1 S., R. 18 E., three-fourths of a mile below Blair's ranch, 1¼ miles above flow line of Magic reservoir, and 10 miles southwest of Bellevue, Blaine County. Camas Creek enters reservoir 3 miles below station.

DRAINAGE AREA.—823 square miles (measured on topographic and Land Office maps).

RECORDS AVAILABLE.—July 6, 1911, to September 30, 1918.

GAGE.—Gurley water-stage recorder on right bank referred to a hook gage inside stilling well and a staff gage outside; installed July 11, 1917, at a datum 0.99 foot lower than former Gurley recorder, which was destroyed by the high water of June 11, 1917. On April 9, 1918, all gages were corrected to former datum. All records referred to this gage prior to April 9, 1918, were reduced to former datum. A Lallie recorder was in use prior to May 3, 1916, when a Gurley recorder was installed at the same location and datum, and referred to an outside staff gage. After the destruction of the Gurley recorder the staff gage was used until about June 22, 1917, when it also was destroyed by high water, and a temporary staff gage was installed at a different datum and used until July 11, 1917. A Stevens 8-day recorder was temporarily installed June 28, 1918, and used until August 2, 1918, when the Gurley recorder was reinstalled. An employee of Idaho Irrigation Co. acted as observer.

DISCHARGE MEASUREMENTS.—Made from cable 30 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel. Control of same material; shifts occasionally. Both banks clean; may be overflowed at extreme high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1917, 5.29 feet at noon June 19 (discharge, 2,760 second-feet); minimum stage, 0.71 foot 5 p. m. to 8 p. m. September 8 (discharge, 75 second-feet).

Maximum stage recorded during year ending September 30, 1918, 5.34 feet June 13 (discharge, 2,660 second-feet); minimum stage, from water-stage recorder, 0.58 foot at 3 a. m. September 2 (discharge, 52 second-feet).

1911–1918: Maximum discharge[1] recorded, 2,760 second-feet, at noon June 19, 1917; minimum stage, 0.57 foot February 22 and 23, 1916 (discharge, 46 second-feet).

ICE.—Stage-discharge relation slightly affected by ice.

DIVERSIONS.—Numerous small diversions are made for irrigation in the vicinity of Bellevue and Hailey. Flood waters are stored in Magic reservoir of the Idaho Irrigation Co. Magic dam is about 9 miles downstream.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; slightly affected by ice January 1–9, 1918. Three well-defined rating curves used, applicable October 1 to November 30, 1916; April 1, 1917, to May 4, 1918, and May 23 to June 12, 1918; May 7–17, June 13 to July 14, and July 22 to September 27, 1918. Curves were used direct except for periods April 1 to July 10, 1917, May 5, 6, 18–22, and July 19–21, 1918, for which the indirect method for shifting control was used. Operation of water-stage recorder satisfactory during 1917, but unsatisfactory during 1918; staff gage read to hundredths every other day during periods when recorder was not operating. Daily discharge ascertained by applying to rating table the staff gage reading or the mean daily gage height obtained by inspection of recorder graph, except for days of no record, for which it was estimated or interpolated; except for periods for which the shifting-control method was used; and except for periods during which stage-discharge relation was affected by ice, for which it was ascertained by means of gage heights and weather records. Records fair for April and June 21 to July 10, 1917, and for 1918; good for other periods.

COOPERATION.—Gage-height record furnished by Idaho Irrigation Co. Discharge measurements furnished by Idaho Irrigation Co. and Idaho State engineer.

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[1] Published incorrectly in previous reports.

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Discharge measurements of Big Wood River near Bellevue, Idaho, during the years ending Sept. 30, 1917 and 1918.

Date	Made by—	Gage height.	Discharge.	Date	Made by—	Gage height.	Discharge.
1917.		*Feet.*	*Sec.-ft.*	1918.		*Feet.*	*Sec.-ft.*
May 10	McConnel [a] and Atkinson [a]	3.27	1,170	Apr. 9	Armstrong and Chapman	1.84	301
10	Crosby and McConnel	3.27	1,180	16	S. H. Chapman [a]	2.13	398
19	Lothrop Crosby [b]	3.76	1,530	22	Armstrong and Chapman	2.22	427
June 2	Crosby and Denecke [b]	4.20	1,860	26	H. Armstrong	2.46	546
21	do	5.25	2,690	May 1	S. H. Chapman	2.65	643
27	Armstrong and Crosby	6.12	1,910	7	do	3.32	1,030
July 7	H. Armstrong [b]	5.51	1,390	15	do	2.80	689
13	Armstrong and Denecke	3.01	885	23	do	2.12	425
17	H. Armstrong	2.59	574	30	do	1.69	258
21	Armstrong and Denecke	2.46	553	June 13	do	5.34	[c] 1,980
24	H. Armstrong	2.19	434	20	do	3.20	948
26	do	1.97	353	24	do	3.36	1,050
27	F. M. Atkinson	1.96	325	30	do	2.18	392
28	Armstrong and Denecke	1.93	324	July 6	do	1.33	162
31	H. Armstrong	1.54	242	9	Lothrop Crosby	1.25	135
Aug. 2	F. M. Atkinson	1.30	184	11	S. H. Chapman	1.29	155
3	Armstrong and Denecke	1.12	142	17	do	1.54	186
6	do	.95	115	17	do	1.54	188
7	do	.91	109	21	do	1.34	160
7	F. M. Atkinson	.90	106	26	do	1.06	113
10	Armstrong and Denecke	.89	102	29	do	.90	86
11	do	.86	98	Aug. 2	do	.95	89
15	do	.84	95	22	do	.74	71
16	do	.77	82	31	do	.63	57
18	do	.80	80	Sept. 6	do	.60	55
18	F. M. Atkinson	.81	90	17	Mathews [b] and Kopelman [b]	.77	69
21	Armstrong and Denecke	.80	87	17	do	.77	76
23	do	.83	94	24	S. H. Chapman	.99	105
28	H. Armstrong	.78	94				
Sept. 4	do	.73	72				
14	do	.77	85				

[a] Employee of Idaho State engineer.
[b] Employee of Idaho Irrigation Co.
[c] Measurement evidently not accurately made.

Daily discharge, in second-feet, of Big Wood River near Bellevue, Idaho, for the years ending Sept. 30, 1917 and 1918.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1916–17.								
1	115	131	165	562	1,830	1,680	210	84
2	117	128	165	578	1,830	1,560	177	82
3	124	128	167	606	1,790	1,560	142	80
4	124	128	171	666	1,680	1,600	149	78
5	122	128	173	672	1,600	1,640	139	81
6	117	128	175	710	1,560	1,500	129	81
7	133	128	181	810	1,710	1,400	103	81
8	158	124	185	958	1,910	1,200	105	80
9	156	124	189	1,070	2,190		106	78
10	156	128	214	1,140	2,270		102	81
11	169	126	231	1,250	2,110	1,100	96	82
12	180	124	258	1,400	1,870	1,100	94	82
13	169	122	281	1,480	1,600	1,030	94	85
14	166	122	286	1,750	1,480	873	94	85
15	161	122	292	2,190	1,710	824	92	85
16	158	122	271	2,350	2,190	749	87	85
17	156	122	258	2,030	2,430	666	82	85
18	150	122	254	1,710	2,590	666	87	85
19	153	122	249	1,520	2,670	684	88	82
20	150	117	268	1,480	2,590	612	88	82
21	150	119	309	1,480	2,590	542	88	82
22	148	124	373	1,520	2,590	511	90	84
23	148	124	456	1,680	2,430	465	87	96
24	145	126	516	1,830	2,190	414	85	106
25	145	126	547	1,830	2,030	355	84	117
26	138	128	562	1,790	1,910	348	85	120
27	136	124	606	1,790	1,870	298	87	120
28	134	124	601	1,870	1,870	258	85	120
29	133	122	589	1,950	1,910	244	85	120
30	132	119	573	1,990	1,830	231	84	120
31	131	.....	.....	1,910	.....	216	82	.....

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Daily discharge in second-feet, of Big Wood River near Bellevue, Idaho, for the years ending Sept. 30, 1917 and 1918—Continued.

Day.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917–18.											
1	120	133		87	144	332	635	245	348	90	55
2	120	.....		102	145	315	749	263	297	95	54
3	120	.....		118	146	318	831	263	250	99	55
4	120	.....		126	130	321	1,030	365	208	103	55
5	120	.....	110	133	113	304	1,140	452	191	100	55
6	117	.....		136	114	286	1,140	584	161	96	54
7	115	.....		140	115	286	1,010	769	153	95	54
8	106	.....		131	116	286		887	147	93	56
9	103	.....		122	118	301	940	1,100	147	92	61
10	105	.....	118	120	120	387		1,330	147	86	60
11	103	.....	127	118	122	387	693	1,480	153	81	58
12	103	.....	136	116	118	387	654	1,520	147	79	57
13	106	.....	136	113	115	396	642	2,510	139	74	58
14	108	.....	136	114	116	406	673	2,460	139	74	63
15	108	.....	137	115	118	396	686	2,380	135	75	71
16	110	.....	138	116	119	387	667	2,180	161	74	72
17	115	.....	137	118	120	383	594	1,980	168	71	71
18	115	.....	136	126	124	362	556	1,940	166	72	72
19	112	.....	127	133	155	355	511	1,900	175	72	84
20	113	.....	118	134	196	362	466	962	172	72	95
21	115	.....	116	136	238	365	434	1,820	161	71	96
22	118	.....	115	138	216	410	402	1,840	147	68	97
23	120	.....	116	140	195	522	395	1,860	137	68	102
24	123	.....	118	141	216	635	395	1,080	128	66	100
25	125	.....	116	142	236	591	376	1,780	124	65	102
26	127	.....	115	141	285	547	358	1,620	106	64	102
27	127	.....	116	140	334	521	364	1,460	99	62	103
28	125	.....	118	142	338	492	369	515	92	62	
29	122	.....	110	.....	341	511	312	462	88	61	105
30	127	.....	102	.....	344	567	254	392	84	58	
31	133	.....	94	.....	348	.....	242	.....	84	56	.....

NOTE.—Discharge estimated on account of lack of gage-height record, July 6, 8–10, 1917; May 8–10, and Sept. 28–30, 1918. Discharge interpolated, Oct. 27–30, 1916; July 29, Aug. 5, Sept. 2, 3, Oct. 21–25, 1917; Jan. 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, Feb. 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, Mar. 2, 4, 6, 8, 10, 12, 14, 16, 20, 22, 24, 26, 28, 30, Apr. 1, 3, 5, 7, 11, 13, 15, 23, 25, May 19, 21, 25, 27, 29, June 14, 16, 18, 22, 26, and Aug. 3, 30, 1918. No record obtained during periods for which no discharge is given. Braced figures show mean discharge for periods indicated.

Monthly discharge of Big Wood River near Bellevue, Idaho, for the years ending Sept. 30, 1917 and 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	180	115	144	8,850
November	131	117	124	7,380
April	606	165	319	19,000
May	2,350	562	1,440	88,500
June	2,670	1,480	2,030	121,000
July	1,680	216	862	53,000
August	210	82	103	6,330
September	120	78	91.0	5,410
1917–18.				
October	133	103	116	7,130
January	138	94	118	7,260
February	142	87	126	7,000
March	348	113	182	11,200
April	635	286	404	24,000
May	1,140	242	626	38,500
June	2,540	245	1,280	76,200
July	348	84	157	9,650
August	103	56	77.2	4,750
September	.....	54	75.9	4,520

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BIG WOOD RIVER BELOW MAGIC DAM, NEAR RICHFIELD, IDAHO.

LOCATION.—In sec. 18, T. 2 S., R. 18 E., half a mile below Magic dam of Idaho Irrigation Co. and 18 miles northwest of Richfield, Blaine County. No tributaries between dam and station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 19, 1911, to September 30, 1918.

GAGE.—Gurley water-stage recorder on right bank; installed April 20, 1916, to replace former Lallie recorder at same location; inspected by employees of Idaho Irrigation Co. Datum presumably unchanged since establishment of station.

DISCHARGE MEASUREMENTS.—Made from cable about 10 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of clean, coarse gravel and small boulders. Control of same material; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1917, from water-stage recorder, 8.97 feet at 11 a. m. and 8 p. m. May 25 (discharge, 3,840 second-feet); minimum stage, 1.42 feet midnight March 27–28 to 11 a. m. March 29 (discharge, 14 second-feet).

Maximum stage recorded during year ending September 30, 1918, from water-stage recorder, 5.23 feet June 15 and 16 (discharge, 1,610 second-feet); minimum stage, 1.49 feet August 21 and 22 (discharge, 15 second-feet).

1911–1918: Maximum stage recorded, 9.2 feet May 18, 1911 (discharge, 5,070 second-feet); "zero discharge" reported February 3, 1915.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—No diversions are made by the Idaho Irrigation Co. immediately above station but numerous ranch diversions are made in the upper drainage basin, the largest quantity of water probably being used in the district around Hailey. Flood waters are stored in Magic reservoir just above station, and first diversion by the company is Richfield canal about 2 miles below.

REGULATION.—Flow past station completely regulated by gates in outlet tunnel at Magic dam.

ACCURACY.—Stage-discharge relation for stages above 1,130 second-feet changed during high water of latter part of May, 1917. Three rating curves used, the first applicable October 1, 1916, to May 25, 1917, well defined between 90 and 1,600 second-feet and extended outside those limits, the second applicable May 26 to September 30, 1917, well defined between 90 and 3,200 second-feet, and the third applicable October 1, 1917, to September 30, 1918, well defined within range of stage which occurred and differing from previous curves only in that it better averages later discharge measurements. Operation of water-stage recorder satisfactory except during period November 26 to December 1, 1916. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph, except for period during which recorder was not operating for which it was estimated from record of gate opening in Magic dam. Records good.

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Discharge measurements of Big Wood River below Magic dam, near Richfield, Idaho, during the years ending Sept. 30, 1917 and 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1917.		*Feet.*	*Sec.-ft.*	1918.		*Feet.*	*Sec.-ft.*
May 3	W. N. McConnel [a]	2.42	138	Mar. 31	Wallis [a] and Chapman	2.02	61
18	Lothrop Crosby [b]	7.96	3,250	Apr. 2	H. Armstrong	2.38	134
29	F. M. Atkinson [a]	6.32	2,440	2	do	2.30	114
June 1	Crosby and Denecke [b]	6.69	2,610	20	do	2.56	157
12	do	6.52	2,450	25	do	2.99	292
20	Lothrop Crosby	7.42	3,020	26	S. H. Chapman	3.06	319
22	F. M. Atkinson	6.92	2,770	May 2	do	3.98	798
26	Armstrong and Crosby	6.19	2,320	14	do	4.54	1,210
July 5	F. M. Atkinson	4.74	1,400	24	do	4.80	1,370
7	H. Armstrong [b]	5.06	1,630	June 15	do	5.22	1,630
17	do	5.08	1,530	24	do	5.04	1,550
17	do	5.08	1,510	July 20	S. S. Carroll [b]	4.69	1,340
28	do	4.94	1,480	24	S. H. Chapman	4.67	1,330
31	F. M. Atkinson	4.84	1,390	30	Morrill [b] and Mathews [b]	4.68	1,370
Aug. 3	Armstrong and Denecke	4.78	1,400	Aug. 4	Mathews and Morrill	1.82	35.3
10	do	4.62	1,230	12	Mathews	2.25	107
18	do	4.48	1,140	15	do	3.51	555
23	do	4.39	1,140	21	do	1.49	14.7
29	H. Armstrong	4.31	1,090	23	S. H. Chapman	1.49	12.7
1918.				28	Mathews	1.64	23.1
Mar. 28	do	2.01	64	Sept. 5	do	3.53	560
30	S. H. Chapman [a]	2.02	56				

[a] Employee of Idaho State engineer. [b] Employee of Idaho Irrigation Co.

Daily discharge, in second-feet, of Big Wood River below Magic dam, near Richfield, Idaho, for the years ending Sept. 30, 1917 and 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1916–17.												
1	76	98	76	90	93	54	102	136	2,520	1,720	1,430	1,030
2	65	98	90	90	93	54	102	138	2,520	1,660	1,390	1,030
3	59	82	90	90	93	54	102	141	2,400	1,560	1,390	1,030
4	56	90	90	90	93	54	102	141	2,220	1,590	1,360	998
5	53	90	90	90	93	54	102	141	2,040	1,530	1,330	998
6	54	90	90	90	95	54	102	143	1,910	1,390	1,330	964
7	58	90	90	92	95	54	102	412	1,910	1,530	1,300	964
8	58	90	90	92	95	54	102	1,230	2,040	1,490	1,300	964
9	40	88	90	92	95	54	103	1,740	2,220	1,390	1,300	939
10	68	88	90	92	95	54	103	2,210	2,520	1,360	1,260	930
11	88	90	90	92	95	54	103	2,500	2,940	1,430	1,260	895
12	136	90	90	92	95	53	103	2,680	2,520	1,460	1,300	860
13	157	90	90	92	79	53	103	2,740	2,100	1,490	1,300	840
14	159	90	90	98	63	53	103	2,860	1,790	1,590	1,300	805
15	159	90	90	93	62	52	103	3,050	1,750	1,620	1,260	759
16	159	90	90	93	62	52	103	3,230	1,980	1,620	1,260	746
17	159	90	90	93	55	51	103	3,420	2,640	1,590	1,230	739
18	159	90	90	93	52	51	103	3,170	3,000	1,590	1,200	739
19	152	88	90	93	52	51	103	2,680	3,250	1,620	1,160	739
20	143	96	90	93	52	51	103	2,440	3,130	1,620	1,160	759
21	141	206	90	93	52	51	112	2,380	2,700	1,620	1,160	772
22	128	206	90	93	52	51	136	2,320	2,760	1,620	1,130	752
23	128	243	90	93	52	51	128	2,440	2,580	1,620	1,130	739
24	128	330	90	93	52	51	120	2,860	2,400	1,620	1,130	726
25	109	330	90	93	53	47	118	3,610	2,280	1,590	1,100	726
26	96		90	93	54	34	120	2,940	2,220	1,560	1,100	707
27	96		90	93	54	30	124	2,760	1,980	1,560	1,100	676
28	98	275	90	93	54	14	130	2,820	1,980	1,490	1,100	646
29	98		90	93	.....	28	134	2,580	2,040	1,490	1,060	576
30	98		90	93	.....	58	134	2,820	1,980	1,460	1,060	385
31	98	.....	90	93	.....	102	.....	3,060	.....	1,430	1,030	.....

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Daily discharge in second-feet of Big Wood River below Magic dam, near Richfield, Idaho, for the years ending Sept. 30, 1917 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917-18.												
1	58	100	125	66	49	50	66	746	1,220	210	1,330	27
2	58	100	202	66	49	52	113	805	1,220	219	1,330	98
3	63	89	202	66	49	52	105	853	1,160	292	1,220	288
4	69	63	202	66	49	52	107	934	1,120	1,280	50	343
5	86	69	202	66	49	52	117	1,090	1,120	1,360	16	502
6	86	69	202	68	49	52	131	1,190	1,160	1,360	16	424
7	84	69	241	68	49	52	131	1,190	1,220	1,310	16	210
8	94	69	277	68	49	52	131	1,190	1,280	1,280	16	189
9	111	69	277	68	50	52	131	1,190	1,280	1,250	16	149
10	117	69	277	68	50	52	131	1,190	1,330	1,250	24	149
11	117	69	277	68	50	52	119	1,220	1,410	1,250	44	121
12	117	69	273	69	50	52	111	1,220	1,500	1,250	100	63
13	117	69	163	69	50	52	113	1,220	1,550	1,280	98	45
14	117	69	163	69	50	52	113	1,220	1,610	1,280	151	57
15	117	69	163	69	50	52	113	1,250	1,610	1,280	581	62
16	117	69	163	69	50	52	119	1,310	1,610	1,280	670	72
17	117	69	163	69	50	52	129	1,390	1,610	1,280	664	80
18	117	69	151	69	50	52	159	1,390	1,550	1,310	475	77
19	117	69	96	69	50	52	159	1,390	1,550	1,330	207	77
20	115	69	84	69	50	52	163	1,360	1,550	1,330	15	77
21	115	69	84	69	50	52	186	1,360	1,550	1,330	15	79
22	115	69	84	69	50	52	199	1,360	1,550	1,330	15	86
23	115	69	72	69	50	53	205	1,360	1,500	1,330	15	86
24	111	70	66	63	50	53	230	1,390	1,500	1,330	20	86
25	100	70	66	49	50	53	292	1,390	1,500	1,330	23	86
26	100	93	66	49	50	54	334	1,410	1,470	1,310	22	86
27	100	105	66	49	50	54	362	1,410	1,440	1,330	22	86
28	100	105	66	49	50	57	419	1,390	1,410	1,330	24	86
29	100	105	66	49	.....	60	460	1,390	1,410	1,330	27	86
30	100	105	66	49	.....	60	552	1,360	326	1,330	27	80
31	100	.....	66	49	.....	60	.....	1,310	.....	1,330	27	.....

NOTE.—Braced figure shows mean discharge for period indicated. Discharge estimated Aug. 4, 1918, on account of unsatisfactory operation of recorder.

Monthly discharge of Big Wood River below Magic dam, near Richfield, Idaho, for the years ending Sept. 30, 1917 and 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916-17.				
October	159	40	106	6,520
November	330	82	150	8,930
December	90	.....	89.5	5,500
January	93	90	92.2	5,670
February	95	52	72.5	4,030
March	102	14	50.9	3,130
April	136	102	110	6,550
May	3,610	136	2,120	130,000
June	3,250	1,750	2,340	139,000
July	1,720	1,360	1,550	95,300
August	1,430	1,030	1,220	75,000
September	1,030	385	814	48,400
The year	3,610	14	731	528,000
1917-18.				
October	117	58	102	6,270
November	105	63	77.2	4,590
December	277	66	151	9,280
January	69	49	63.6	3,910
February	50	49	49.7	2,760
March	60	50	53.1	3,260
April	552	66	190	11,300
May	1,410	746	1,240	76,200
June	1,610	326	1,380	82,100
July	1,360	210	1,200	73,800
August	1,330	15	235	14,400
September	502	27	132	7,860
The year	1,610	15	409	296,000

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BIG WOOD RIVER BELOW NORTH GOODING CANAL, NEAR SHOSHONE, IDAHO.

LOCATION.—In sec. 15, T. 4 S., R. 18 E., 300 yards below headworks of North Gooding canal, 13 miles northeast of Shoshone, Lincoln County, and 14 miles below Magic dam.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1911, to September 30, 1918.

GAGE.—Vertical staff on right bank installed July 8, 1918, at a datum 6.00 feet higher than previous gages. Prior to that date a vertical staff gage on left bank directly opposite, was used until about May 14, 1917, when it was destroyed by high water. A temporary vertical staff gage was installed May 15, 1917, at same location but at a datum 7.51 feet higher and was used until July 9, 1917. Thereafter, until July 8, 1918, a new permanent staff gage was used; at same location and datum as gage used prior to about May 14, 1917. All gage readings made on the temporary staff gage were corrected to former datum. Gage read by employees of Idaho Irrigation Co.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 100 feet below gage. Measuring conditions are unfavorable on account of rough cross-section and irregular velocities.

CHANNEL AND CONTROL.—Channel cut in lava rock. Stream bed rough. Control somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1917, 13.4 feet May 12–14 (discharge, 1,690 second-feet); minimum stage, 7.27 feet September 30 (discharge, 30 second-feet).

Maximum stage recorded during year ending September 30, 1918, 9.25 feet May 6 (discharge, 242 second-feet); stream reported dry August 8–14, 22–31, and September 1 and 2.

1911–1918: Maximum stage recorded, 15.0 feet May 18, 1911 (discharge, 3,180 second-feet); minimum discharge, no flow, February 9–14, 22, and March 5 and 6, 1911, October 19, 20 and 26, 1912, August 8–14, 22–31, and September 1 and 2, 1918.

ICE.—Observations discontinued during winter.

DIVERSIONS.—Station is below all diversions of Idaho Irrigation Co. North Gooding and Richfield canals divert between station and Magic dam.

REGULATION.—Flow past station is regulated by operation of gates at Magic dam and headgates of North Gooding and Richfield canals.

ACCURACY.—Stage-discharge relation practically permanent, but owing to changes in gage datum several rating curves were used. Standard rating curve used April 14, 1917, to July 7, 1918, well defined between 25 and 980 second-feet; was used direct April 14 to May 14, 1917; three parallel curves used for remainder of period, applicable May 15 to July 8 and July 9 to December 13, 1917, and March 23 to July 7, 1918. Curve used July 8 to September 30, 1918, fairly well defined below 200 second-feet. Gage read to hundredths once or twice daily except during periods noted in footnote to table of daily discharge. Daily discharge ascertained by applying daily or mean daily gage height to rating table except as indicated in footnote to table of daily discharge. Records fair except those for days on which headgates at dam were manipulated, which are subject to considerable error.

COOPERATION.—Gage-height record furnished by Idaho Irrigation Co. Discharge measurements furnished by Idaho Irrigation Co. and Idaho State engineer.

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Discharge measurements of Big Wood River below North Gooding canal, near Shoshone, Idaho, during the years ending Sept. 30, 1917 and 1918.

Date.	Made by—	Gage height.	Discharge	Date	Made by—	Gage height.	Discharge.
1917.		*Ft.*	*Sec.-ft.*	1917.		*Ft.*	*Sec.-ft.*
May 4	W. N. McConnel [a]	7.87	50	Sept. 8	H. Armstrong	7.52	44.2
June 26	F. M. Atkinson [a]	11.25	735	16	Armstrong and Bate [b]	7.53	47.5
28	Armstrong and Crosby	10.20	422	25	S. H. Chapman	7.51	40.1
July 9	H. Armstrong [b]	8.28	116	1918.			
11	Atkinson and Chapman	8.34	122	Jan. 30	Armstrong and Bate	7.30	25.0
18	H. Armstrong	8.74	158	Mar. 23	Chapman and Wallis [a]	7.21	27.1
23	Armstrong and Denecke [b]	9.01	209	Apr. 6	S. H. Chapman	7.11	20.9
Aug. 1	F. M. Atkinson	8.63	157	17	do	7.33	30.1
2	H. Armstrong	8.48	130	25	H. Armstrong	7.72	64
6	Armstrong and Denecke	8.12	90	27	S. H. Chapman	8.04	79
8	do	7.90	70	May 10	do	8.99	195
17	do	7.67	51	21	do	8.68	162
17	S. H. Chapman [a]	7.69	60	July 3	Morrill [b]	8.65	155
17	do	7.68	55	8	S. H. Chapman	2.11	72
21	F. M. Atkinson	7.60	51	14	do	1.88	59
22	Armstrong and Denecke	7.52	38.9	18	S. S. Carroll [b]	1.86	59
24	S. H. Chapman	7.54	46.2	29	S. H. Chapman	1.93	58
30	H. Armstrong	7.56	49.4	Aug. 18	do	2.40	105

[a] Employee of Idaho State engineer. [b] Employee of Idaho Irrigation Co.

Daily discharge, in second-feet, of Big Wood River below North Gooding canal, near Shoshone, Idaho, for the years ending Sept. 30, 1917 and 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1916-17.							1916-17.						
1	.....	43	259	334	153	47	16	140	475	697	226	59	45
2	.....	43	234	259	140	46	17	76	593	1,030	180	59	44
3	.....	43	259	1,120	134	47	18	67	561	1,530	180	49	45
4	.....	43	218	1,120	134	47	19	104	400	1,320	173	48	45
5	.....	48	502	1,220	95	46	20	140	334	1,420	210	48	45
6	.....	44	1,120	734	95	45	21	112	295	1,220	210	50	46
7	.....	122	1,030	160	95	45	22	85	295	939	210	47	45
8	.....	939	1,070	100	76	45	23	80	277	1,120	210	47	44
9	.....	1,170	1,120	116	67	45	24	76	355	983	218	48	45
10	.....	1,170	1,220	110	67	45	25	44	593	773	210	47	45
11	.....	1,530	1,530	116	67	45	26	37	626	773	180	47	44
12	.....	1,690	1,420	128	63	45	27	41	593	593	195	47	44
13	.....	1,690	1,030	160	63	45	28	37	593	400	195	48	47
14	355	1,690	813	188	63	45	29	37	259	334	180	47	45
15	248	475	697	226	63	46	30	40	475	626	180	47	30
							31	.....	475	.....	173	48	.....

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Daily discharge, in second-feet, on Big Wood River below North Gooding canal, near Shoshone, Idaho, for the years ending Sept. 30, 1917 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917-18.										
1	30		40			90	100	140	50	
2	19	46	37		38	122	95	160	49	
3	19		38			140	95	160	49	76
4	20	37	44			146	95	146	21	76
5	21	36	40		35	226	95	153	15	76
6	34	37	40		25	242	95	105	48	76
7	33	21	40		26	218	105	122	7.6	2.0
8	31	37	59		28	226	146	76		1.6
9	40	37	37		30	210	146	67		10
10	51	37	37		33	202	146	67		21
11	52	37	37		27	202	140	68		16
12	51	37	37		30	195	166	68		15
13	52	38	35		33	188	218	68		14
14	53	31			30	173	226	62		15
15	53	31			30	173	226	63	16	24
16	53	31			30	173	234	63	116	28
17	53	37			30	173	242	56	105	42
18	54	37			32	166	210	59	105	42
19	54	37			32	166	226	56	105	40
20	54	37			30	160	218	58	50	41
21	54	36			32	160	210	56	4.8	40
22	54	31			32	153	202	62		46
23	53	31		26	32	146	202	62		47
24	57	31			30	153	202	62		47
25	51	15			58	146	210	72		50
26	51	26			58	153	188	60		50
27	52	38			76	153	180	60		49
28	53	38			90	153	188	63		49
29	54	44			90	153	173	49		47
30	55	44			90	160	234	49		48
31	56					153		44		

NOTE.—Discharge interpolated on account of missing gage readings, Apr. 15, 19, 21, 23, Aug. 19, Oct. 26-29, Nov. 26, Dec. 1, 1917, and Sept. 26, 1918; estimated Nov. 1-3, 1917, Apr. 1-4 and Aug. 15, 1918, on basis of watermaster's report. Stream reported dry, Aug. 8-14, 22-31, and Sept. 1 and 2, 1918. No record obtained during periods for which no discharge is given. Braced figures show mean discharge for periods indicated.

Monthly discharge of Big Wood River below North Gooding canal, near Shoshone, Idaho, for the years ending Sept. 30, 1917 and 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
April 14-30	455	37	101	3,410
May	1,690	43	579	35,600
June	1,530	218	876	52,100
July	1,220	100	297	18,300
August	153	47	69.7	4,290
September	47	30	44.8	2,670
The period				116,400
1917-18.				
October	57	19	45.7	2,810
November		15	35.6	2,120
December 1-13	59	35	40.1	1,030
April	90	25	40.7	2,420
May	242	90	170	10,500
June	242	95	174	10,400
July	160	44	79.2	4,870
August	116	0	23.9	1,470
September	76	0	36.3	2,160

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BIG WOOD RIVER NEAR GOODING, IDAHO.

LOCATION.—In sec. 21, T. 6 S., R. 14 E, at Cleek's ranch, 3½ miles above bridge on upper road between Bliss and Hagerman, 5 miles above diversion dam for King Hill project, and 6 miles southwest of Gooding, Gooding County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 26, 1916, to September 30, 1918.

GAGE.—Vertical staff on right bank bolted to rock ledge; read by Mrs. I. P. Cleek.

DISCHARGE MEASUREMENTS.—Made by wading or from cable a short distance above gage.

CHANNEL AND CONTROL.—Bed composed of lava rock, boulders, and coarse gravel; practically permanent. Control formed by well-defined bed of lava; deposition of gravel occasionally causes slight shifts.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.84 feet March 21 (discharge, 290 second-feet); stream reported dry September 5–13.

1916–1918: Maximum stage recorded, 7.60 feet May 26, 1917 (discharge, 2,320 second-feet). Stream reported dry January 17–22, 1917, during ice period, and September 5–13, 1918.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—Below all diversions of the Twin Falls North Side Land & Water Co. and above Big Malad Springs. Justice and Croco ditches (combined capacity, about 15 second-feet) divert 3 miles below gage; a few second-feet are occasionally wasted into river about 2 miles below gage.

REGULATION.—Flow regulated by diversions above station.

COOPERATION.—Field data furnished by Twin Falls North Side Land & Water Co.

Discharge measurements of Big Wood River near Gooding, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 29	S. H. Chapman [a]	2.03	142	May 13	Burdick and West [b]	1.46	54.7
Apr. 12	Baldwin and Burdick	1.96	126	July 26	William West	.92	12.8
25	S. H. Chapman	.90	13.6	Sept. 17	do	.12	[c] .3

[a] Watermaster.
[b] Hydrographers, Twin Falls North Side Land & Water Co.
[c] Estimated.

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Daily discharge, in second-feet, of Big Wood River near Gooding, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept
1	8.7	95	62	109	87	64	103	7.4	119	59	7.2	0.4
2	2.9	93	67	109	87	101	144	5.2	69	38	31	.4
3	30	90	60	116	84	109	195	7.2	22	23	24	.2
4	41	90	90	108	81	152	160	9.4	35	17	17	.2
5	39	89	67	97	80	160	144	25	22	11	17	.0
6	36	78	76	97	78	125	152	68	16	33	17	.0
7	34	69	80	117	75	101	108	90	10	30	9.4	.0
8	33	67	33	101	72	106	117	69	4.9	14	1.9	.0
9	32	63	186	122	66	109	100	78	4.2	6.0	1.6	.0
10	33	64	213	111	63	119	105	78	3.6	5.0	1.5	.0
11	37	64	195	64	62	116	111	78	3.4	5.5	1.6	.0
12	35	62	195	93	59	186	133	82	3.4	5.2	1.6	.0
13	35	66	186	90	54	279	116	52	3.5	5.2	1.7	.0
14	76	68	279	89	48	213	89	41	18	4.4	1.8	.2
15	84	69	222	87	44	152	72	27	26	4.0	1.8	.4
16	92	69	213	87	47	160	81	22	48	4.2	1.8	.6
17	100	78	204	87	48	160	103	27	57	4.5	1.6	.6
18	100	43	231	87	36	195	76	23	60	3.8	7.2	1.3
19	97	46	240	87	33	240	113	28	55	4.5	11	2.2
20	100	57	169	87	33	269	101	32	52	3.8	10	1.9
21	100	59	152	87	48	290	54	23	52	5.0	11	2.1
22	103	59	160	89	54	231	23	18	80	10	11	1.4
23	100	58	160	90	54	178	17	12	82	18	4.6	18
24	101	59	127	90	54	178	17	13	100	17	3.8	18
25	103	48	122	92	54	169	15	9.4	106	18	.9	18
26	95	46	116	92	55	169	14	12	108	14	.9	18
27	103	43	114	92	57	195	11	15	93	14	2.2	18
28	93	44	109	90	66	186	16	52	84	13	3.8	22
29	93	59	117	89	.....	144	13	80	76	9.4	2.2	20
30	87	62	109	87	.....	106	10	67	72	6.4	.6	20
31	91	.....	109	87	.....	124	.....	95	.....	6.2	.5	.....

NOTE.—Stage-discharge relation affected by ice Jan. 12 to Feb. 26; discharge estimated from daily gage heights, weather records, and observer's notes. Discharge interpolated Oct. 31, June 6, 7, Aug. 15, and Sept. 30.

Monthly discharge of Big Wood River near Gooding, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	103	2.9	68.2	4,190
November	95	43	65.2	3,880
December	279	33	144	8,850
January	122	64	94.5	5,810
February	87	33	60.0	3,330
March	290	64	164	10,100
April	195	10	83.8	4,990
May	95	5.2	40.2	2,470
June	119	3.4	49.5	2,950
July	59	3.8	13.3	818
August	31	.5	6.75	415
September	20	.0	5.46	325
The year	290	.0	66.5	48,100

BIG WOOD SLOUGH AT HAILEY, IDAHO.

LOCATION.—In sec. 9, T. 2 N., R. 18 E., at highway bridge one-eighth of a mile northeast of steel highway bridge across Big Wood River and one-eighth of a mile southwest of Hailey, Blaine County.

RECORDS AVAILABLE.—June 11, 1915, to September 30, 1918.

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GAGE.—Vertical staff spiked to downstream side of highway bridge; installed April 4, 1917; read by employee of Idaho Irrigation Co. Prior to April 4, 1917, an inverted stadia board at same location was used; 2.0-foot mark on stadia board corresponds to 2.0-foot mark on present gage.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—One channel at all stages. Bed composed of sand and gravel. Banks covered with brush and subject to overflow. Control is top of a wood stave water pipe laid in bed of stream about 15 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1917, 2.62 feet May 7 (discharge, 244 second-feet); minimum stage, 3.25 feet (inverted gage) November 15 (discharge, 2.6 second-feet).

Maximum discharge recorded during year ending September 30, 1918, 197 second-feet August 15–17; minimum stage, 0.70 foot December 17 and February 1 (discharge, 2.0 second-feet). A lower discharge may have occurred during period of ice effect, February 2–5.

1915–1918: Maximum stage recorded, 2.62 feet May 7, 1917 (discharge, 244 second-feet); minimum discharge, 2.0 second-feet December 17, 1917, and February 1, 1918 (a lower discharge may have occurred during period of ice effect, February 2–5, 1918).

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—None.

REGULATION.—The amount of water passing gage is affected by load at power plant half a mile upstream, and there is considerable diurnal fluctuation. The main river is affected inversely by any such regulation, so that the accuracy of the summation of the two records is presumably affected only slightly by this factor.

ACCURACY.—Stage-discharge relation not permanent; affected by ice December 27, 29, and 30, 1916, January 13–18, and 22, 1917, and January 12–16, and February 2–5, 1918, and by débris on control May 28 to June 8, 1917. Curve used October 1, 1916, to August 8, 1917, well defined between 10 and 165 second-feet; was used direct except for period May 28 to June 8, 1917, for which the indirect method for shifting control was used. Curve used August 9, 1917, to February 1, 1918, fairly well defined between 10 and 170 second-feet. Curve used February 6 to September 30. 1918, well defined between 10 and 180 second-feet; was used direct except for period April 25 to July 21, 1918, for which the indirect method for shifting control was used. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table except for periods for which the shifting-control method was used; except for periods of ice effect for which it was ascertained by means of gage heights, weather records, and comparison with flow of main river; and except as indicated in footnote to tables of daily discharge. Records fair prior to April 1, 1918; thereafter good.

COOPERATION.—Gage-height record furnished by Idaho Irrigation Co. Discharge measurements furnished by Idaho Irrigation Co. and Idaho State engineer.

Big Wood Slough is a natural channel of Big Wood River that is utilized also as a tailrace for the Hailey power plant. The record from this station represents a portion of the natural flow of Big Wood River and that in conjunction with the record at the near-by station on the main river will show the entire flow of the river at this point. For record of station on the main river see page 105. For record of combined flow of Big Wood River and Big Wood Slough see pages 108 and 109.

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Discharge measurements of Big Wood Slough at Hailey, Idaho, during the years ending Sept. 30, 1917 and 1918.

Date	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1917.		*Feet.*	*Sec-ft.*	1918.		*Feet.*	*Sec-ft.*
May 31	F. M. Atkinson [b]	(a)	138	Apr. 22	H. Armstrong	0.89	10.1
June 18	do	(a)	154	May 1	S. H. Chapman [b]	.94	9.8
27	Armstrong [c] and Crosby [c]	1.22	22.3	June 10	do	1.41	35.7
July 7	H. Armstrong	1.09	16.1	Aug. 3	do	2.10	173
16	do	.93	6.1	7	do	2.10	173
30	F. M. Atkinson	(a)	2.6	21	do	2.09	161
Aug. 14	do	(a)	112	Sept. 15	Mathews [c]	1.19	24.2
16	Armstrong and Denecke [c]	(a)	111	16	do	1.15	22.0
21	do	(a)	106				
27	F. M. Atkinson	(a)	49.6				
28	H. Armstrong	(a)	48.0				
Sept. 4	do	2.28	164				
14	do	2.36	165				

[a] Measurement referred to a temporary staff gage in tailrace of power plant.
[b] Employee of Idaho State engineer.
[c] Employee of Idaho Irrigation Co.

Daily discharge, in second-feet, of Big Wood Slough at Hailey, Idaho, for the years ending Sept. 30, 1917 and 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1916–17.												
1	14	20	2.9	174	135	146	66	60	146	19	5.5	170
2	14	20	2.9	174	165	137	78	194	156	18	5.5	154
3	14	20	3.0	194	165	137	70	204	156	12	5.5	162
4	14	20	3.0	174	165	165	63	204	156	18	6.0	154
5	14	21	3.0	174	165	165	76	204	146	17	6.0	154
6	14	20	40	174	165	165	78	244	146	12	8.5	154
7	15	20	31	174	165	165	78	244	165	14	12	154
8	15	20	25	174	165	165	80	124	165	26	15	147
9	15	25	24	174	165	165	80	124	174	14	61	147
10	15	27	137	165	165	165	107	165	174	14	84	154
11	15	24	165	165	165	146	107	165	128	18	71	154
12	18	19	110	174	165	128	108	184	128	18	56	154
13	17	15	5.7		165	137	110	184	128	21	96	162
14	17	8.9	3.8		165	156	110	146	146	15	96	170
15	17	2.6	3.8		165	165	110	165	146	8.9	96	162
16	17	3.0	4.4	130	165	146	98	184	146	6.7	95	154
17	17	3.0	190		165	137	78	194	128	5.5	102	162
18	20	21	184		165	137	86	27	146	6.0	117	147
19	20	4.4	184	146	165	137	126	22	146	5.5	110	162
20	20	4.4	165	184	146	146	93	23	124	4.9	102	162
21	20	3.2	165	165	165	107	126	21	128	4.9	102	154
22	20	2.9	165	150	165	84	128	21	117	4.9	88	162
23	20	2.9	174	146	165	98	146	23	93	4.9	102	177
24	20	2.9	184	146	165	102	165	21	146	4.9	102	170
25	20	2.9	184	174	184	102	184	20	128	4.9	106	162
26	21	2.9	184	174	146	81	60	21	124	4.9	111	162
27	21	2.9	170	165	165	102	74	23	22	5.5	116	162
28	21	2.9	165	165	128	72	59	174	19	5.5	117	162
29	21	2.9	150	165	.....	78	59	156	14	5.5	124	162
30	19	2.9		165	.....	78	60	156	21	5.5	170	162
31	19	.....	156	140	.....	78	.....	156	.....	5.5	170	.....

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Daily discharge, in second-feet, of Big Wood Slough at Hailey, Idaho, for the years ending Sept. 30, 1917 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917–18.												
1	162	132	162	3.0	2.0	9.1	13	9.4	8.2	8.8	144	18
2	162	132	154	3.0		9.7	12	12	11	10	144	24
3	162	132	147	2.9	3.0	9.7	9.4	15	13	9.7	156	24
4	154	132	147	2.9		10	9.4	16	16	9.8	150	26
5	154	140	154	2.9		10	8.2	18	16	10	144	26
6	147	140	154	2.6	20	7.0	8.8	16	21	10	144	26
7	147	132	147	2.8	17	7.6	8.8	14	21	14	169	25
8	147	132	147	2.8	11	8.2	9.4	10	21	17	169	26
9	147	132	147	2.6	8.2	8.8	7.0	8.2	21	19	169	21
10	147	140	147	2.4	11	9.4	8.2	7.0	36	21	169	25
11	147	132	147	2.3	10	10	9.4	5.9	54	27	183	26
12	147	132	147		10	9.8	9.4	5.9	54	27	169	24
13	147	132	147		10	9.7	9.4	6.4	74	28	169	24
14	154	19	85	2.2	7.0	9.4	9.2	7.0	62	14	169	23
15	147	19	82		6.4	9.1	9.1	10	32	16	197	24
16	154	17	42		9.7	9.4	8.8	5.9	16	17	197	22
17	154	17	2.0	3.0	11	11	8.2	5.3	12	102	197	20
18	162	17	3.3	3.0	9.7	12	8.2	5.3	23	118	68	47
19	114	19	3.3	2.9	7.0	12	8.2	5.3	19	120	156	49
20	111	15	3.3	2.8	7.9	13	8.2	5.3	20	124	169	47
21	108	132	3.3	2.6	8.0	14	8.8	5.3	21	120	169	19
22	105	132	3.3	2.4	8.2	16	9.7	5.3	26	156	169	20
23	114	124	2.6	2.5	9.7	16	11	5.3	31	144	169	21
24	114	124	3.2	2.5	8.5	18	11	5.3	26	144	156	20
25	132	124	2.9	2.9	7.0	19	11	5.3	21	144	156	20
26	140	124	3.0	2.8	10	19	10	5.9	20	140	183	19
27	140	162	3.0	2.5	8.2	14	9.4	5.3	20	140	183	18
28	140	162	3.0	2.4	7.0	10	8.8	5.3	16	140	183	18
29	132	162	2.9	4.4	.....	8.2	8.5	5.3	11	140	183	17
30	140	162	3.0	2.6	.....	8.2	10	6.4	10	135	183	20
31	140	.....	2.9	2.3	.....	13	.....	7.6	.....	140	23	.....

NOTE.—Discharge interpolated on account of missing gage readings, Nov. 26 and Dec. 23, 1916, Nov. 25, Dec. 2 and 16, 1917, Jan 21, Feb. 21, Mar. 7–10, 12, 17, 20, 24, 27, Apr. 10, 14, 27, May 4, 21, 30, June 2, 3, 8, 20, 22, 26, 28, July 4, and Aug. 4, 1918. Discharge estimated on account of unreliable gage height, Dec. 17, 1916. Braced figures show mean discharge for periods indicated.

Monthly discharge of Big Wood Slough at Hailey, Idaho, for the years ending Sept. 30, 1917 and 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	21	14	17.5	1,080
November	27	2.6	11.6	690
December	.....	2.9	101	6,210
January	.....	.....	160	9,840
February	184	128	162	9,000
March	165	72	129	7,930
April	184	59	95.4	5,680
May	244	20	124	7,620
June	174	14	125	7,440
July	26	4.9	10.7	658
August	170	5.5	79.3	4,880
September	177	147	159	9,460
The year	244	2.6	97.4	70,500
1917–18.				
October	162	105	141	8,670
November	162	15	109	6,490
December	162	2.0	71.0	4,370
January	.....	.....	2.67	164
February	20	.....	8.45	469
March	19	7.0	11.3	695
April	13	7.0	9.35	556
May	18	5.3	8.07	496
June	74	8.2	25.1	1,490
July	156	8.8	73.1	4,490
August	197	23	161	9,900
September	49	17	24.6	1,460
The year	197	.....	54.2	39,200

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CAMAS CREEK NEAR BLAINE, IDAHO.

LOCATION.—In sec. 15, T. 1 S., R. 16 E., 500 feet below sheep bridge, a quarter of a mile north of Macon siding on Central Idaho branch of Oregon Short Line Railroad, 1½ miles below Malad Bridge of Central Idaho Railroad, 2¼ miles above backwater of Magic reservoir, and 4 miles southeast of Blaine, Blaine County. No tributaries or diversions between station and Magic reservoir.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 9, 1912, to September 30, 1918. Results of discharge measurements made in 1911 by Idaho Irrigation Co. are also available.

GAGE.—Gurley water-stage recorder on left bank; installed June 1, 1916, to replace Lallie water-stage recorder at same location which had been used prior to that date. Location and datum of gage unchanged since 1912. An employee of Idaho Irrigation Co. or of Idaho State engineer acts as observer.

DISCHARGE MEASUREMENTS.—Made from the sheep bridge or by wading.

CHANNEL AND CONTROL.—One channel at all stages. Bed of stream rocky but control somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1917, 5.00 feet at 4 p. m. June 1 (measured discharge, 872 second-feet); minimum stage from water-stage recorder 1.04 feet at midnight September 18-19 (discharge, 4.6 second-feet); probably not actual extremes.

Maximum stage recorded during year ending September 30, 1918, 4.70 feet at 3 p. m. April 3 (measured discharge, 736 second-feet); minimum stage from water-stage recorder, 0.92 foot August 3 and 4 (discharge, 2.7 second-feet); probably not actual extremes. High-water marks indicated that a stage of about 7.0 feet occurred several days previous to April 3.

1911–1918: Maximum stage recorded, 10.76 feet April 12, 1916 (measured discharge, 5,240 second-feet); minimum discharge, 2.5 second-feet September 2. 1915; probably not actual extremes.

ICE.—Observations discontinued during winter.

DIVERSIONS.—Many small diversions are made above station, but no data are available concerning them.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; subject to change at high stages. Rating curve used October 1 to November 8, 1916, well defined between 5 and 450 second-feet. Standard curve used June 1, 1917, to September 30, 1918, fairly well defined between 3 and 900 second-feet; was used direct for periods June 26 to September 21, 1917, and April 23 to September 27, 1918; indirect method for shifting control used for intervening periods. Operation of water-stage recorder unsatisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph, except for periods during which recorder was not operating, for which it was ascertained by estimation or interpolation, and except for periods for which the shifting-control method was used. Records fair.

COOPERATION.—Gage height furnished by Idaho Irrigation Co. Discharge measurements furnished by Idaho Irrigation Co. and Idaho State engineer.

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Discharge measurements of Camas Creek near Blaine, Idaho, during the years ending Sept. 30, 1917 and 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1917.		*Feet.*	*Sec.-ft.*	1918.		*Feet.*	*Sec.-ft.*
June 1	Crosby [a] and Denecke [a].	5.00	872	Apr. 3	H. Armstrong	4.70	736
8	do	4.02	596	5	do	4.30	595
16	F. M. Atkinson [b]	3.41	402	12	do	4.27	598
19	Crosby and Denecke	3.32	383	23	Chapman and Armstrong	2.90	260
26	Crosby and Armstrong	2.75	220	May 2	S. H. Chapman [b]	2.65	197
July 6	H. Armstrong [a]	2.05	83	8	do	2.64	189
16	do	1.69	33.7	16	do	2.21	99
27	F. M. Atkinson	1.53	24.7	24	do	1.91	56
30	H. Armstrong	1.45	18.8	June 6	do	1.70	41.4
Aug. 3	F. M. Atkinson	1.38	16.8	30	do	1.48	20.9
7	Armstrong and Denecke	1.26	13.6	July 6	do	1.22	10.8
15	F. M. Atkinson	1.20	7.9	11	do	1.10	7.4
16	Armstrong and Denecke	1.18	10.6	17	do	1.14	7.0
21	H. Armstrong	1.20	9.3	26	do	.96	4.0
Sept. 5	do	1.14	8.3	Aug. 23	do	1.00	3.1
				Sept. 20	do	1.13	5.6

[a] Employee of Idaho Irrigation Co. [b] Employee of Idaho State engineer.

Daily discharge, in second-feet, of Camas Creek near Blaine, Idaho, for the years ending Sept. 30, 1917 and 1918.

Day.	Oct.	Nov.	June.	July.	Aug.	Sept.	Day.	Oct.	Nov.	June.	July.	Aug.	Sept.
1916–17.							1916–17.						
1	8.6	15	852	132	17	6.9	16	15	.....	407	36	8.4	6.6
2	9.6	15	792	114	17	6.6	17	15	.....	398	37	9.0	4.8
3	10	16	749	98	15	6.3	18	14	.....	389	37	11	4.8
4	11	15	712	91	13	6.0	19	15	.....	380	35	9.7	5.3
5	11	15	675	84	12	6.6	20	16	.....	369	32	9.7	6.0
6	11	16	639	77	12	6.3	21	15	.....	343	29	9.0	5.0
7	13	17	602	73	10	6.0	22	15	.....	319	27	8.4	.....
8	14	16	565	69	10	6.0	23	15	.....	288	26	8.1	.....
9	14	.....	565	65	11	5.8	24	15	.....	257	26	7.8	.....
10	14	.....	579	61	10	5.5	25	15	.....	232	26	7.5	.....
11	17	.....	565	56	9.7	5.5	26	15	.....	217	25	8.4	.....
12	16	.....	551	52	10	5.5	27	15	.....	195	24	8.7	.....
13	16	.....	510	48	9.4	5.6	28	14	.....	174	22	9.0	.....
14	15	.....	469	44	9.0	5.8	29	14	.....	165	20	9.0	.....
15	15	.....	438	40	9.0	6.3	30	14	.....	138	18	8.1	.....
							31	14	.....	.....	18	7.5	.....

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Daily discharge, in second-feet, of Camas Creek near Blaine, Idaho, for the years ending Sept. 30, 1917 and 1918—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917-18.							
1			195	58	18	2.8	3.8
2			195	54	16	2.8	4.0
3		734	195	48	14	2.7	4.2
4		670	190	43	13	2.7	4.4
5		607	195	40	11	2.8	4.6
6		537	202	37	9.0	2.8	4.8
7		523	200	34	7.8	2.8	5.0
8		456	193	33	6.6	2.9	5.2
9		415	190	35	6.6	2.9	5.4
10		428	176	35	6.3	2.8	5.6
11		680	160	35	6.0	3.3	5.8
12		607	142	33	6.1	3.6	6.0
13		579	118	27	6.2	3.6	6.0
14		510	113	27	6.4	3.6	8.4
15		469	108	27	6.6	3.6	12
16			102	34	6.8	3.6	11
17			100	37	6.9	3.6	8.7
18			92	35	6.6	3.6	8.1
19			87	33	6.0	3.6	7.5
20		360	77		5.5	3.6	6.9
21			67	40	4.6	3.6	6.3
22			64		4.8	3.6	6.0
23		252	60		4.6	3.6	6.0
24		247	57	67	4.6	3.5	6.1
25		240	48	57	3.9	3.5	6.2
26	456	232	46	52	3.2	3.4	6.3
27	663	224	44	40	3.2	3.3	6.3
28		212	54	31	3.2	3.3	
29		200	57	26	3.0	3.3	6.5
30		195	60	20	2.9	3.3	
31			61		2.9	3.6	

NOTE.—Discharge interpolated on account of lack of gage-height record, June 4-7, 15, 17, 18, July 4, 5, 7-15, 28, 29, Sept. 13, 1917, Apr. 4, May 1, 15, 22, 23, June 29, July 7, 12-16, 25, Aug. 14-22, 31, and Sept. 1-11, 18, 19, and 24-26, 1918; estimated Apr. 11, 16-22, June 20-23, and Sept. 28-30, 1918. No record obtained during periods for which no discharge is given. Braced figures show mean discharge for periods indicated.

Monthly discharge of Camas Creek near Blaine, Idaho, for the years ending Sept. 30, 1917 and 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916-17.				
October	17	8.6	13.9	855
November 1-8	17	15	15.6	248
June	852	138	451	26,800
July	132	18	49.7	3,060
August	17	7.5	10.1	621
September 1-21	6.9	4.8	5.87	244
1918.				
April 3-30	734	195	412	22,900
May	202	44	118	7,260
June	67	20	38.6	2,300
July	18	2.9	6.85	421
August	3.6	2.7	3.28	202
September	12	3.8	6.34	377
The period				33,500

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LITTLE WOOD RIVER NEAR RICHFIELD, IDAHO.

LOCATION.—In sec. 30, T. 4 S., R. 20 E., half a mile above heading of Dietrich canal of Idaho Irrigation Co. and 1 mile east of railroad station at Richfield, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1911, to September 30, 1918.

GAGE.—Vertical staff on right bank; read by employees of Idaho Irrigation Co. Original gage was carried out by ice March 12, 1913, and present gage was installed at the same location and datum on March 27, 1913. Datum of gage lowered 1 foot September 5, 1918, but all gage readings made during the period September 5–30, 1918, were corrected to original datum.

DISCHARGE MEASUREMENTS.—Made from a suspension footbridge just below gage or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of coarse gravel and small rocks; rough. Control probably permanent. Stage-discharge relation may be slightly affected during summer by light growth of aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1917, 4.45 feet June 1 (discharge, 601 second-feet); minimum stage, 2.23 feet July 16 and 17 (discharge, 54 second-feet).

Maximum stage recorded during year ending September 30, 1918, 3.58 feet April 12 (discharge, 316 second-feet); minimum stage, 1.92 feet June 19 (discharge, 22 second-feet).

1911–1918: Maximum stage recorded, 4.5 feet May 17 and 18, 1911 (discharge, 722 second-feet); minimum stage, 1.92 feet June 19, 1918 (discharge, 22 second-feet).

ICE.—Stage-discharge relation seriously affected by ice; observations discontinued during winter.

DIVERSIONS.—Small ranch diversions are made above station. Dietrich canal of Idaho Irrigation Co. diverts a short distance below.

REGULATION.—None.

ACCURACY.—Stage-sischarge relation changed during winter of 1917–18, when no records were obtained. Two rating curves used which are well defined below 450 second-feet, one applicable April 16 to October 17, 1917, and the other March 27 to September 30, 1918. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table and estimating or interpolating for periods of no record as noted in footnote to daily-discharge table. Records of daily discharge below 450 second-feet good; above that discharge and for periods of estimation and interpolation they are fair.

COOPERATION.—Gage-height record furnished by Idaho Irrigation Co. Discharge measurements furnished by Idaho Irrigation Co. and Idaho State engineer.

Discharge measurements of Little Wood River near Richfield, Idaho, during the years ending Sept. 30, 1917 and 1918.

Date	Made by—	Gage height.	Discharge.	Date	Made by—	Gage height.	Discharge.
1917.		*Ft.*	*Sec.-ft.*	1918.		*Ft.*	*Sec.-ft.*
Apr. 16	W. N. McConnel[a]	3.26	274	Mar. 27	H. Armstrong	3.30	263
May 2	do	3.79	418	Apr. 8	do	3.29	242
June 28	F. M. Atkinson[a]	2.92	175	13	do	3.58	300
July 10	H. Armstrong[b]	2.48	85	24	do	3.34	257
20	do	2.45	82	May 6	S. H. Chapman[a]	3.25	243
27	do	2.45	78	20	do	2.44	78
Aug. 1	do	2.36	69	June 1	do	2.08	40
1	Atkinson and Chapman	2.35	74	July 11	Carroll[b]	2.39	75
19	F. M. Atkinson	2.50	100	Aug. 9	Mathews[b]	2.42	80
20	H. Armstrong	2.52	97	24	S. H. Chapman	2.63	118
25	do	2.56	107	26	do	2.61	115
31	do	2.57	103				

[a] Employee of Idaho State engineer. [b] Employee of Idaho Irrigation Co.

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Daily discharge, in second-feet, of Little Wood River near Richfield, Idaho, for the years ending Sept. 30, 1917 and 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Date.	Apr.	May.	June.	July.	Aug	Sept.
1916–17.													
1	.....	400	601	142	71	111	16	263	541	277	54	80	145
2	.....	421	571	136	67	115	17	.....	601	277	54	80	146
3	.....	} 470	541	130	63	117	18	.....	601	277	56	90	146
4	.....		541	130	67	120	19	.....	571	291	70	97	154
5	.....	511	541	113	69	130	20	.....	541	320	83	97	157
6	.....	481	541	102	71	130	21	.....	541	291	80	97	157
7	.....	511	481	98	73	130	22	.....	541	263	80	100	157
8	.....	511	466	90	69	130	23	.....	541	249	82	104	157
9	.....	541	451	90	70	134	24	.....	541	236	80	111	157
10	.....	541	451	91	74	134	25	.....	571	209	90	108	159
11	.....	541	481	93	74	134	26	.....	601	209	91	111	159
12	.....	511	511	93	76	134	27	.....	571	196	83	111	157
13	.....	541	466	82	77	134	28	.....	571	174	80	102	157
14	.....	541	451	71	77	134	29	.....	601	157	76	102	159
15	.....	541	348	63	85	134	30	.....	601	150	76	111	168
							31	.....	601	.....	73	107	.....

Day.	Oct.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917–18.								
1	168	.....	} 250	220	39	33	82	120
2	172	.....		230	40	37	80	121
3	172	.....		220	43	41	78	122
4	168	.....		230	43	40	77	123
5	165	.....	251	230	37	38	78	124
6	168	.....	230	240	36	37	79	125
7	168	.....	230	240	38	41	81	126
8	168	.....	240	230	41	43	82	127
9	170	.....	251	230	44	51	83	128
10	172	.....	262	230	47	58		129
11	172	.....	283	220	49	77		
12	172	.....	316	199	45	78		
13	172	.....	294	177	40	80		
14	172	.....	283	150	36	83		
15	172	.....	294	104	34	83		
16	168	.....	262	99	26	83	} 100	
17	168	.....	251	94	30	86		} 140
18	.....	.....	251	98	26	90		
19	.....	.....	240	90	22	96		
20	.....	.....	220	86	23	96		
21	.....	.....	230	72	26	103		
22	.....	.....	230	68	31	103		
23	.....	.....	240	57	33	98		
24	.....	.....	240	43	37	93	118	150
25	.....	.....	240	39	41	93	116	150
26	.....	.....	230	39	37	93	115	149
27	.....	251	240	41	37	88	115	148
28	.....	.....	240	41	39	88	116	148
29	.....	.....	230	36	37	88	117	} 148
30	.....	.....	220	36	32	86	118	
31	.....	.....	.....	34	.....	84	119	.....

NOTE.—Discharge estimated on account of missing gage heights, May 1, 3, and 4, 1917, Apr. 1–4, Aug. 10–23, and Sept. 11–23, 29, and 30, 1918; interpolated, May 19, 1917, July 4, 28, 30, 31, Aug. 1–3, 5–8, 25, 27–31, Sept. 1–4, 6–9, and 25–27, 1918. No record obtained during periods for which no discharge is given. Braced figures show mean discharge for periods indicated.

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Monthly discharge of Little Wood River near Richfield, Idaho, for the years ending Sept. 30, 1917 and 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
May	601	400	538	33,100
June	601	150	367	21,800
July	142	54	88.1	5,420
August	111	63	86.7	5,330
September	168	111	142	8,450
The period				74,200
1917–18.				
October 1–17	172	165	170	5,730
April	316	220	250	14,900
May	240	34	133	8,189
June	49	22	36.3	2,160
July	103	33	73.6	4,530
August	119	77	98.5	6,060
September	150	120	137	8,150

BRUNEAU RIVER NEAR ROWLAND, NEV.

LOCATION.—In sec. 29, T. 47 N., R. 56 E., at Hiram Salls's ranch, half a mile below Taylor Creek, 1½ miles above McDonald Creek and Rowland post office, Elko County, and 100 miles north of Elko, nearest railway point.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 19, 1913, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff gage fastened to left abutment of footbridge; read by Mrs. Hiram Salls.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and large boulders; fairly permanent. No well-defined control. Left bank subject to overflow at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.42 feet at 6 a. m. April 12 (discharge, 304 second-feet); minimum stage, 0.38 foot August 12 and 13 (discharge, 5 second-feet).

1913–1918: Maximum stage recorded, 7.0 feet May 14, 1917 (discharge, 1,440 second-feet); minimum stage recorded in 1918.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—A few small ditches divert water above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent during year, except as affected by ice. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Bruneau River near Rowland, Nev., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 5	L. W. Jordan	0.96	33.3
	do	1.03	37.6

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Daily discharge, in second-feet, of Bruneau River near Rowland, Nev., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		23	42	33		37	276	231	128	23	7	5
2		23	39	33		45	253	238	124	23	7	6
3		23	33	30		42	209	258	124	20	7	6
4		23	33	33		45	203	271	124	19	6	6
5	18	24	33	33	30	47	201	281	124	18	6	6
6		25	31	33		54	188	283	130	15	6	6
7		26	31	37		42	180	267	136	15	6	6
8	18	27	32	37	30	44	198	255	141	14	6	7
9	18	27	32	37	30	38	227	274	147	14	6	9
10	18	27	33	23	32	59	281	244	147	15	6	10
11	18	27	33		37	68	297	222	149	14	5	10
12	18	27	33	28	35	76	301	198	143	13	5	10
13	19	29	33		34	68	292	184	139	13	5	9
14	20	29	33		34	56	281	173	126	13	5	9
15	20	28	33	32	39	51	251	167	118	13	6	12
16	20	27	33	33	44	56	220	165	105	13	7	13
17	20	27	33		39	84	198	157	89	13	7	12
18	20	26	33		42	91	178	151	88	12	7	12
19	20	26	33		47	102	169	147	128	10	8	10
20	22	26	33		44	107	171	165	100	10	8	10
21	23	26	33	31	44	128	194	171	207	9	8	10
22	23	26	33		46	157	220	155	151	9	7	
23	23	26	33		45	188	242	143	132	9	7	
24	23	26	32		39	209	244	143	138	9	6	
25	23	29	32	29	46	242	251	143	88	9	6	
26	23	30	32		45	253	227	139	62	9	5	10
27	23	30	32		43	281	207	136	50	8	5	
28	22	30	34	29	45	278	207	132	45	7	5	
29	22	33	33		.....	242	220	130	40	7	5	
30	23	37	33		.....	251	231	128	33	7	5	
31	23	.....	33		.....	288	.....	128	.....	7	5	.....

NOTE.—Braced figures show estimated mean discharge for periods indicated. Stage-discharge relation affected by ice during greater part of period from Jan. 11 to Feb. 7.

Monthly discharge of Bruneau River near Rowland, Nev., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	23	.....	20.3	1,250
November	37	23	27.1	1,610
December	42	31	33.2	2,040
January	37	.....	30.9	1,900
February	47	.....	37.5	2,080
March	288	37	120	7,380
April	301	169	227	13,500
May	283	128	190	11,700
June	207	33	115	6,840
July	23	7	12.6	775
August	8	5	6.1	375
September	13	5	9.1	542
The year	301	5	69.1	50,000

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OWYHEE RIVER NEAR GOLD CREEK, NEV.

LOCATION.—In W. ½ sec. 24, T. 44 N., R. 54 E., an eighth of a mile below Wild Horse dam site, 9 miles west of Gold Creek, Elko County, and 65 miles north of Elko.

DRAINAGE AREA.—209 square miles (measured on map compiled by United States Indian Service).

RECORDS AVAILABLE.—March 26, 1916, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank; inspected by engineers of United States Geological Survey.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of rocks and loose sand. Control is rock riffle in each of two channels where stream is divided by small island about 500 feet below gage; subject to change by work of beavers. Left bank high and rocky; right bank is overflowed at extremely high stages; dense growth of willows along banks.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder; 4.06 feet at 10.30 a. m. April 11 (discharge, 260 second-feet); minimum discharge not determined because of backwater from beaver dams; probably less than 1 second-foot during part of August.

1916–1918: Maximum stage recorded, from water-stage recorder, 8.5 feet at 3 a. m. May 14, 1917 (discharge, from extension of rating curve, 1,380 second-feet). Minimum discharge during 1918.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Wild hay meadows above station irrigated during flood season.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly by high water on May 29, affected by ice January 20 to March 24, and by backwater from beaver dams July 22 to September 30. Rating curves well defined below 450 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good except for periods estimated, for which they are fair.

Discharge measurements of Owyhee River near Gold Creek, Nev., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 4	L. W. Jordan	1.74	10.1	June 12	J. W. Bones	1.70	14.1
Mar. 11	do	1.85	17.0	Sept. 4	do	[a] 2.24	1.2
Apr. 23	do	2.76	83				

[a] Stage-discharge relation affected by backwater from beaver dam 400 feet below gage.

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Daily discharge, in second-feet, of Owyhee River near Gold Creek, Nev., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6	12	17	10			131	66	32	3		
2	6	11	15	9			108	65	27	3		1
3	6	12	13	9			76	67	24	2		
4	6	12	11	14			67	67	24	2		1
5	6	10	10	14			63	70	24	2		1
						12						
6	6	10	10	10			64	67	24	2		1
7	7	11	7	12			73	64	27	2		1
8	7	12	9	14			91	63	24	2		2
9	7	12	9	12			144	71	22	2		2
10	7	11	10	7			189	60	18	2		2
11	7	10	7	12		17	217	49	14	2		2
12	7	10	9	12			164	42	14	2		2
13	9	11	11	11			157	40	12	2		2
14	9	12	12	13			110	36	10	2		4
15	9	12	11	8	7		95	33	8	2		4
											1	
16	9	14	12	12			80	36	9	1		3
17	10	12	12	10			74	38	12	1		3
18	10	12	13	13		38	61	36	12	1		2
19	10	10	12	8			59	34	22	1		2
20	12	9	15				66	31	23	1		3
21	12	9	10				65	27	31	1		2
22	12	10	9				72	25	31			2
23	12	10	13				76	26	28			5
24	12	10	12				76	24	22			5
25	12	12	10	8		93	76	22	16			5
26	12	12	13			110	73	23	12	1		5
27	12	9	14			106	67	29	9			5
28	11	8	14			84	63	45	7			4
29	9	11	13		.....	102	59	46	5			4
30	8	15	11		.....	115	63	42	4			5
31	10	.....	9		.....	138	.....	46	.....			.....

NOTE.—Braced figures show mean discharge for periods indicated, when stage-discharge relation was affected by ice or beaver dams; estimated by comparison with discharge of Owyhee River near Owyhee.

Monthly discharge of Owyhee River near Gold Creek, Nev., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	12	6	8.97	552
November	15	8	11.0	655
December	17	7	11.4	701
January	14	.....	9.87	607
February	.....	.....	7.0	389
March	138	.....	44.5	2,740
April	217	59	92.6	5,510
May	71	22	44.8	2,750
June	32	4	18.2	1,080
July	3	.....	1.55	95
August	.....	.....	1.0	61
September	5	1	2.70	161
The year	217	.....	21.1	15,300

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OWYHEE RIVER NEAR OWYHEE, NEV.

LOCATION.—In sec. 21, T. 46 N., R. 53 E., 40 feet above mouth of Jones Brook, half a mile above J. P. Jones ranch, 8 miles southeast of Owyhee, Elko County, and 14 miles above Nevada-Idaho State line; 5,550 feet above sea level.

DRAINAGE AREA.—380 square miles (measured on Forest Service maps).

RECORDS AVAILABLE.—November 29, 1913, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by employee of United States Indian Service.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 125 feet above gage.

CHANNEL AND CONTROL.—Bed consists of ledge rock and boulders filled in with sand and gravel; fairly permanent. One channel at all stages. Banks covered with brush; both subject to overflow. Control for low stages is riffle between gage and Jones Brook; permanent. For high stages rapids below brook may become control.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 4.66 feet at 1 a. m. April 12 (discharge, 406 second-feet); minimum stage, 1.26 feet at 5 a. m. September 7 (discharge less than 2 second-feet).

1914–1918: Maximum discharge, 1,750 second-feet on May 15, 1917; minimum discharge occurred in 1918.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—No important diversions above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 1,500 second-feet. Operation of water-stage recorder satisfactory except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good for periods when recorder was in operation; for remainder of year, poor.

Discharge measurements of Owyhee River near Owyhee, Nev., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 14	L. W. Jordan	2.32	47.3	June 11	J. W. Bones	2.72	87
Apr. 24	do	3.59	207	Sept. 3	do	1.35	2.8

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Daily discharge, in second-feet, of Owyhee River near Owyhee, Nev., for the year ending Sept. 30, 1918.

Day.	Oct.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	14		257	195	115	16		
2	14		233	198	106	14		
3	14		187	206	103	13		
4	14		156	209	102			
5	14		141	219	103			
6	14		141	217	106			
7	14	30	144	201	107			
8	14		167	196	103	11		
9	14		214	200	102			
10	15		303	180	97			
11	15		382	160	90			
12	15		342	138	85			
13	16		310	131	82			
14	16	47	269	125	75	9	6	
15	17	50	219	121	72			11
16	17	52	198	121	68			
17		64	176	124	73			14
18		79	181	121	66			12
19		84	186	116	60			12
20		104	191	110	77			13
21		121	196	102	75	8		13
22		132	201	98	84			12
23		160	206	99	73			10
24	20	179	211	96	61			12
25		206	219	96	47			13
26		227	211	98	39			13
27		264	193	111	31	7	6	14
28		211	182	144	26		6	14
29		201	182	158	22	7	6	14
30		217	190	134	19		5	13
31		249	.....	130	.....		4	.....

NOTE.—Braced figures show mean discharge for periods indicated, when recorder was not in operation; estimated from discharge measurements, weather records, and comparison with flow of Owyhee River near Gold Creek.

Monthly discharge of Owyhee River near Owyhee, Nev., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	17.3	1,060
November	.....	.....	20	1,190
December	.....	.....	20	1,230
January	.....	.....	20	1,230
February	.....	.....	20	1,110
March	264	.....	98.0	6,030
April	382	141	213	12,700
May	219	96	147	9,040
June	115	19	75.6	4,500
July	.....	.....	9.45	581
August	.....	.....	5.90	363
September	14	2	8.47	504
The year	382	2	54.6	39,300

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JACK CREEK NEAR TUSCARORA, NEV.

LOCATION.—In sec. 35, T. 42 N., R. 52 E., at R. M. Woodward's ranch, on Elko-Mountain City stage road, 8 miles above confluence with South Fork of Owyhee River, and 12 miles northeast of Tuscarora, Elko County.

DRAINAGE AREA.—31 square miles (measured on Forest Service maps).

RECORDS AVAILABLE.—May 15, 1913, to September 30, 1918.

GAGE.—Vertical staff on left bank about 500 feet below Woodward's house; read by R. M. Woodward. Datum raised 1.50 feet September 1, 1914.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; shifts during high water. No well-defined control. Banks low and lined with willows; may be overflowed to some extent during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.70 feet at 6 p. m. June 13 (discharge, 124 second-feet); minimum stage recorded, 0.18 foot September 2 and 3 (discharge, 0.6 second-foot).

1913–1918: Maximum stage recorded, 3.6 feet at 6 p. m. May 14, 1917 (discharge, 465 second-feet); minimum stage occurred in 1918.

ICE.—Stage-discharge relation not affected by ice during year.

DIVERSIONS.—No important diversions above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water in May. Rating curve used October 1 to May 7 well defined. Curve used May 16 to September 30 fairly well defined. Gage read to hundredths once daily with occasional breaks of from 1 to 3 days when no reading was obtained. Daily discharge ascertained by applying daily gage height to rating table and interpolating for days when gage was not read. Records good.

COOPERATION.—Gage-height record furnished by R. M. Woodward.

Discharge measurements of Jack Creek near Tuscarora, Nev., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 13	L. W. Jordan	0.55	7.5	June 10	J. W. Bones	1.58	110
Apr. 24	do	1.16	60	Sept. 2	do	.18	.6

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Daily discharge, in second-feet, of Jack Creek near Tuscarora, Nev., for the year endi Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sep
1	2	2	3	4	5	6	31	65	57	22	2	
2	2	2	3	4	5	6	29	70	56	20	2	
3	2	2	3	4	5	7	28	77	58	16	2	
4	2	2	3	4	5	7	24	86	60	14	2	
5	2	2	3	4	5	7	26	92	70	13	2	
6	2	2	3	4	5	7	28	98	79	11	2	
7	2	2	3	4	5	7	31	121	92	10	2	
8	2	2	3	4	5	7	37	114	97	9	2	
9	2	2	3	4	5	7	51	105	102	9	2	
10	2	2	3	4	6	7	55	90	107	9	2	
11	2	2	3	4	6	7	58	72	116	8	2	
12	2	2	3	4	6	7	60	59	116	8	2	
13	2	2	3	4	6	8	55	55	124	7	2	
14	2	2	3	4	6	10	42	52	110	6	2	
15	2	2	3	4	6	13	37	52	97	6	2	
16	2	2	3	4	6	13	33	53	84	5	2	
17	2	2	3	4	6	13	29	52	79	4	2	
18	2	2	3	4	6	14	28	52	72	3	2	
19	2	2	3	4	6	15	28	52	65	3	2	
20	2	3	3	4	6	16	31	53	60	2	2	
21	2	3	3	4	6	17	33	55	58	2	2	
22	2	3	3	4	6	24	42	56	54	2	2	
23	2	3	3	4	6	33	53	57	52	2	2	
24	2	3	3	5	6	35	60	58	50	2	2	
25	2	3	4	5	6	44	78	58	48	2	2	
26	2	3	4	5	6	48	60	58	44	2	2	
27	2	3	4	5	6	53	53	60	40	2	2	
28	2	3	4	5	6	32	51	72	35	2	2	
29	2	3	4	5	.....	35	58	62	28	2	1	
30	2	3	4	5	.....	35	60	59	25	2	1	
31	2	.....	4	5	.....	33	.....	58	.....	2	1	.....

Monthly discharge of Jack Creek near Tuscarora, Nev., for the year ending Sept. 30, 191

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2	2	2.00	1
November	3	2	2.37	1
December	4	3	3.23	1
January	5	4	4.26	2
February	6	5	5.68	3
March	53	6	18.5	1,1
April	78	24	43.0	2,5
May	121	52	68.5	4,2
June	124	25	71.2	4,2
July	22	2	6.7	41
August	2	1	1.9	11
September	3	1	1.8	10
The year	124	1	19.1	13,9

JORDAN CREEK NEAR JORDAN VALLEY, OREG.

LOCATION.—In sec. 9, T. 30 S., R. 45 E., in canyon at lower end of Jordan Valley 9 miles below Jordan Valley poet office, Malheur County. Cow Creek enter Jordan Creek 7 miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 28, 1911, to September 30, 1918.

GAGE.—Inclined staff on right bank an eighth of a mile below upper end of canyon read by Marcos Renteria.

DISCHARGE MEASUREMENTS.—Made by wading or from cable near gage.

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CHANNEL AND CONTROL.—Bed consists of lava rock; probably permanent. Control affected by growth of moss during summer.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.96 feet at 5 p. m. March 27 (discharge, 1,700 second-feet); stream dry for greater part of August and September.

1911–1918: Maximum stage recorded, 12.3 feet April 26, 1917 (discharge, 3,620 second-feet); creek reported dry for periods of several weeks nearly every year.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Practically entire summer flow of stream is used by many small diversions above gage. Flood water is also diverted into Antelope reservoir.

REGULATION.—None, except that due to diversions.

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined. Gage read to hundredths three times weekly except during winter, when it was read once weekly. Daily discharge ascertained by applying daily gage height to rating table and interpolating for days of no gage height. Records fair.

Discharge measurements of Jordan Creek near Jordan Valley, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 9	H. J. Dean	3.71	56.2
May 31	G. C. Baldwin	4.85	203

Daily discharge, in second-feet, of Jordan Creek near Jordan Valley, Oreg., for the year Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.6	6.1	32	82		62	1,320	590	198	24	0.6	.....
2	.6	6.9	45	76	40	87	1,180	559	193	20	.4	.....
3	.7	6.9	45	69		113	960	590	184	16	.2	.....
4	.7	6.6	45	67	58	138	824	590	184	12	.0	.....
5	.8	6.4	45	65	70	131	689	655	184	11	.1	.....
6	.8	6.1	36	62	81	124	640	655	184	9.1	.1	.....
7	.9	6.0	27	58	93	88	590	607	188	9.1	.1	.....
8	.8	5.8	27		90	106	590	559	193	9.1	.1	.....
9	.8	6.6	43		88	124	590	590	184	9.1	.2	.....
10	.8	7.2	44		88	118	877	529	180	8.4	.2	.....
11	.8	7.5	44		88	124	1,270	442	176	8.3	.2	.....
12	.8	7.8	44		96	192	1,220	391	160	8.2	.2	.....
13	.8	16	44		105	260	1,130	340	152	8.1	.3	.....
14	.8	8.4	44		99	193	1,130	340	142	7.2	.2	.....
15	.9	9.1	44		94	160	960	328	131	6.8	.1	.....
16	1.1	8.4	44	40	88	200	837	364	118	6.4	.0	.....
17	1.2	8.4	44		85	240	724	340	99	6.0	.0	.....
18	1.3	11	44		81	302	590	293	88	5.6	.0	.....
19	1.5	10	45		78	364	559	276	71	4.2	.0	.....
20	1.6	9.1	47		63	442	559	260	66	3.7	.....	.....
21	1.8	9.0	49		71	516	590	250	60	3.6	.....	.....
22	2.0	8.8	51		80	590	724	240	320	3.4	.....	2.2
23	2.2	9.9	53		88	689	798	220	590	3.1	.....	3.0
24	3.0	11	58		76	837	798	211	240	2.8	.....	3.9
25	3.7	12	63	56	63	918	760	202	131	2.6	.....	4.7
26	3.7	11	68	56	68	1,090	724	193	88	2.3	.....	5.6
27	3.6	12	73	56	74	1,720	689	176	71	2.0	.....	6.4
28	3.5	14	78	56	68	1,470	590	176	51	1.5	.....	7.3
29	5.8	16	83		.....	1,220	590	211	38	1.3	.....	8.1
30	5.6	18	88	45	.....	1,090	590	220	26	1.1	.....	9.0
31	5.3	.....	93		.....	1,200	.....	202	.....	0.9	.....	.....

NOTE.—Braced figures show mean discharge for periods indicated, when stage-discharge relation was affected by ice; estimated from weather records and observer's notes. Probably zero discharge during most of period from Aug. 20 to Sept. 21.

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Monthly discharge of Jordan Creek near Jordan Valley, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	5.8	0.6	1.89	116
November	18	2.8	9.40	559
December	93	27	51.3	3,150
January	82	.....	49.0	3,010
February	105	.....	76.9	4,270
March	1,720	62	481	29,600
April	1,320	559	803	47,800
May	655	176	374	23,000
June	590	26	156	9,280
July	24	.9	7.00	430
August 1-19	.6	.0	.16	6.0
September 22-30	9.0	2.2	5.58	99.6

BOISE RIVER NEAR TWIN SPRINGS, IDAHO.

LOCATION.—About sec. 23, T. 4. N., R. 6 E. (unsurveyed), a quarter of a mile above Birch Creek, 1½ miles above flow line of Arrowrock reservoir, 4 miles below Twin Springs, Boise County, and 18 miles above Arrowrock.

DRAINAGE AREA.—830 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 22, 1911, to September 30, 1918.

GAGE.—Friez water-stage recorder on right bank installed April 4, 1915, to replace vertical staff at same location and datum; inspected by Roy Call.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 50 feet above gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; practically permanent. Control formed by well-defined gravel and boulder riffle. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 7.10 feet at 4 a. m. June 14 (discharge, 7,990 second-feet); minimum stage, 1.96 feet at 2 a. m. November 20, 1917 (discharge, 232 second-feet.)

1911-1918: Maximum stage recorded, 7.82 feet at 3 a. m. May 15, 1917 (discharge, 9,430 second-feet); minimum stage recorded, 1.73 feet at 10.30 p. m. November 13, 1916 (discharge, 142 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—No important diversions above station and none between it and Dowling station below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph and interpolating for days of no gage height. Records good.

Discharge measurements of Boise River near Twin Springs, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	H. J. Dean	2.11	319	Mar. 28	C. F. Elford	3.95	2,160
Mar. 24	C. F. Elford	3.55	1,770	June 6	R. B. Kilgore	5.63	4,720
25	.....do	3.75	1,930	July 24	.....do	2.56	626

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Daily discharge, in second-feet, of Boise River near Twin Springs, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	340	334	934	1,280	369	467		3,810	2,940	1,670	524	351
2	334	334	600	1,090	516	501		4,350	2,860	1,580	592	340
3	328	334	388	1,000	546	538		4,800	3,200	1,490	531	328
4	328	340	351	982	524	576		5,270	3,900	1,400	516	322
5	322	334	407	886	524	553		5,650	4,530	1,310	501	317
6	322	334	407	802	509	494		5,080	5,270	1,220	486	317
7	322	334	351	820	538	524		4,620	5,270	1,140	471	305
8	322	328	328	749	501	584		4,530	5,840	1,080	456	334
9	322	328	363	706	453	524		3,900	6,410	1,090	441	460
10	322	322	357	487	480	528		3,360	6,790	1,110	426	401
11	322	322	328	623	553	531	2,360	3,020	6,990	1,030	420	363
12	322	322	340	706	584	535		2,770	6,990	972	401	346
13	328	322	413	647	584	539		2,860	7,590	915	394	346
14	334	311	474	623	553	542		3,110	7,190	953	394	426
15	328	311	407	608	501	546		3,360	6,220	906	446	516
16	322	317	382	600	509	561		3,360	5,460	839	553	420
17	317	300	394	576	546	600		3,020	5,080	802	501	382
18	305	294	600	600	487	714		2,690	4,890	776	509	363
19	322	268	689	516	453	962		2,450	4,800	749	460	351
20	328	263	706	460	413	1,180		2,290	4,530	731	453	346
21	328	284	615	460	487	1,250	2,370	2,220	4,620	681	474	346
22	322	328	600	480	516	1,300	2,770	2,220	4,080	664	487	340
23	322	322	1,190	546	538	1,380	3,200	2,370	4,530	631	453	388
24	322	334	1,410	546	509	1,640	3,280	2,530	3,720	623	426	446
25	334	357	1,040	623	440	1,920	3,360	2,690	3,200	655	413	394
26	346	322	953	576	480	2,020	3,110	2,690	2,770	615	401	382
27	334	278	1,990	509	453	2,120	2,770	2,690	2,370	608	394	369
28	328	334	3,280	553	426	2,220	2,860	2,450	2,140	561	382	363
29	300	388	3,020	553	.....		3,110	2,370	1,850	531	376	363
30	328	576	2,220	546	.....	2,350	3,540	2,610	1,760	509	376	401
31	340	.....	1,580	426	.....		.....	2,860	.....	509	363	.....

NOTE.—Braced figures show mean estimated discharge for periods indicated, when recorder was not in operation. Discharge interpolated Mar. 10–14, 26, 27, June 30 to July 5, Aug. 4–9.

Monthly discharge of Boise River near Twin Springs, Idaho, for the year ending Sept. 30, 1918.

[Drainage area, 830 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	346	300	326	0.393	0.45	20,000
November	576	263	329	.396	.44	19,600
December	3,280	328	875	1.05	1.21	53,800
January	1,280	426	664	.800	.92	40,800
February	584	369	500	.602	.63	27,800
March	.....	467	1,060	1.28	1.48	65,200
April	.....	.....	2,590	3.12	3.48	154,000
May	5,650	2,220	3,290	3.96	4.56	202,000
June	7,590	1,760	4,590	5.53	6.17	273,000
July	1,670	509	915	1.10	1.27	56,300
August	592	363	452	.545	.63	27,800
September	516	305	371	.447	.50	22,100
The year	7,590	263	1,330	1.60	21.74	962,000

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ARROWROCK RESERVOIR AT ARROWROCK, IDAHO.

LOCATION.—In E. ½ sec. 13, T. 3 N., R. 4 E., at Arrowrock, Boise County, 22 miles by road east from Boise.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Graduations painted on center of upstream vertical face of concrete dam, in September, 1917; read by E. L. Ballard, superintendent of Arrowrock dam. Vertical staff in seven sections on south side of reservoir immediately above dam used after storage in reservoir was initiated, with exception of few months in 1916, when chain gage on dam was used. Uncertainty as to when changes in staffs by ice and frost action occurred make publication of actual observations prior to use of painted gage on dam face seem unwarranted.

EXTREMES OF CONTENTS.—Maximum stage recorded during year, 3,214.1 feet June 14 (contents, 285,800 acre-feet); minimum stage, 2,971.0 feet October 7-11 (contents, 239 acre-feet).

STORAGE.—Capacity of reservoir about 280,000 acre-feet as determined by latest capacity table; elevation of crest of spillway weir and top of movable crest, 3,205 feet and 3,211 feet, respectively. Record of storage or release each month used for determining discharge without storage for gaging station at Dowling below dam.

COOPERATION.—Record of gage height and table of storage capacity furnished by United States Reclamation Service.

Daily contents, in acre-feet, of Arrowrock reservoir at Arrowrock, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1...	2,740	13,690	19,130	95,020	109,800	111,600	218,000	249,500	274,100	272,300	166,400	71,120
2...	2,080	13,800	21,250	97,540	109,100	111,300	225,500	250,600	275,600	269,400	163,300	67,630
3...	1,480	14,140	22,320	99,070	108,100	111,300	231,000	253,400	276,800	266,800	160,200	63,900
4...	1,100	14,400	22,660	100,800	108,200	112,000	235,600	257,300	277,700	263,400	157,000	60,600
5...	770	14,520	22,930	102,300	108,400	114,300	238,000	263,900	279,800	260,400	153,800	57,600
6...	482	14,790	23,380	103,700	108,400	116,100	240,300	271,200	282,200	257,300	151,000	54,720
7...	239	14,830	24,180	104,700	108,400	117,900	242,400	274,400	283,100	254,500	147,700	52,020
8...	239	14,870	24,830	105,700	108,800	119,300	242,400	275,300	284,000	250,600	144,800	49,160
9...	239	14,910	25,810	106,400	108,400	121,900	243,200	275,300	284,900	247,000	141,800	46,950
10...	239	14,930	26,900	107,100	108,400	124,200	246,100	274,100	284,900	243,700	138,600	45,600
11...	239	14,950	27,890	106,900	108,400	126,400	247,500	272,000	285,200	240,800	135,300	43,750
12...	533	14,950	29,050	107,400	108,800	128,500	249,200	269,200	285,400	237,700	131,900	41,930
13...	1,080	15,020	30,390	108,100	109,100	131,000	250,900	266,500	285,600	234,100	128,600	40,150
14...	1,550	15,100	32,350	108,800	109,800	133,400	252,300	264,500	285,800	231,800	125,300	38,550
15...	1,970	15,140	34,810	109,100	110,000	135,600	252,800	263,400	285,100	227,800	121,800	37,340
16...	2,600	15,200	36,410	109,300	110,000	137,000	252,300	263,600	284,000	224,000	118,600	36,980
17...	3,500	15,260	37,870	109,600	110,100	138,000	250,900	263,100	283,200	220,600	115,300	35,930
18...	4,570	15,820	39,450	110,000	110,100	138,400	248,900	263,400	282,700	217,200	111,900	35,210
19...	5,400	16,030	41,880	110,300	110,800	140,000	247,500	264,800	282,500	213,500	108,800	34,100
20...	6,380	16,200	44,300	110,500	110,800	143,000	247,000	265,700	282,200	209,800	105,500	32,950
21...	7,370	16,260	46,800	110,100	110,800	147,000	247,500	266,200	281,900	206,000	102,300	31,730
22...	8,230	16,410	48,720	109,600	110,800	151,000	248,900	266,500	281,900	202,200	99,680	30,460
23...	9,100	16,540	49,930	109,100	110,800	155,200	251,700	267,100	281,900	198,100	97,200	29,400
24...	9,920	16,620	52,570	109,100	111,100	160,200	253,700	267,700	281,600	194,500	94,700	28,600
25...	10,780	16,710	56,640	109,300	111,300	165,700	254,000	269,200	280,700	190,800	92,110	27,890
26...	11,560	16,880	59,220	110,000	111,300	171,400	254,000	270,600	280,100	187,100	89,660	27,030
27...	12,230	16,920	62,470	110,300	111,500	179,700	252,800	271,800	279,500	183,200	86,900	26,190
28...	12,680	16,920	69,100	110,000	111,600	186,900	250,900	272,900	278,600	180,100	84,380	25,380
29...	13,070	17,060	79,300	110,000	.....	194,500	249,800	272,900	276,500	176,800	81,450	24,480
30...	13,180	17,770	86,750	110,000	.....	201,900	248,900	272,300	274,700	173,300	78,180	23,780
31...	13,390	.....	91,660	110,000	.....	209,500	.....	272,600	.....	169,800	74,780	.....

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BOISE RIVER AT DOWLING'S RANCH, NEAR ARROWROCK, IDAHO.

LOCATION.—In sec. 15, T. 3 N., R. 4 E., at Dowling's ranch, Elmore County, three-quarters of a mile above Moore Creek, 2 miles below Highland power dam, and 4 miles below Arrowrock.

DRAINAGE AREA.—2,230 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 13, 1911, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank installed March 19, 1915, to replace an inclined staff set to same datum and at practically the same location; inspected by Al Davis and J. N. Davis.

DISCHARGE MEASUREMENTS.—Made from cable about 50 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; slightly shifting at intervals. Control formed by well-defined gravel and boulder riffle; shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 8.01 feet at 11 a. m. June 14 (discharge, 12,200 second-feet); minimum stage occurred December 15 and 28 when stage was below gage owing to closing of gates at Arrowrock dam (estimated discharge, 20 second-feet).

1911–1918: Maximum stage recorded, 8.7 feet on June 13, 1911 (discharge, 15,100 second-feet); minimum discharge occurred December 15 and 28, 1917.

ICE.—Stage-discharge relation unaffected by ice.

DIVERSIONS.—No important diversions above station. New York canal of Boise project, United States Reclamation Service, diverts about 10 miles below and has maximum capacity of 2,500 second-feet. A number of smaller canals, total capacity of 2,500 second-feet, divert below New York canal.

REGULATION.—Since February 21, 1915, flow has been regulated by Arrowrock reservoir, 4 miles upstream, which has storage capacity of 280,000 acre-feet. Water is stored during winter and spring and released during irrigation season.

ACCURACY.—Stage-discharge relation practically permanent. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph. Records excellent.

COOPERATION.—Several discharge measurements furnished by United States Reclamation Service and Idaho State Engineer.

Discharge measurements of Boise River at Dowling's ranch, near Arrowrock, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	H. J. Dean	2.34	413	July 6	Steward and Tallman [b]	5.00	3,570
19	Steward [a] and Paul [a]	2.19	352	9	do	5.03	3,590
Mar. 9	G. C. Baldwin	1.75	172	26	R. B. Kilgore	4.71	3,030
29	C. F. Elford	3.07	929	Aug. 2	Steward and Tallman	4.50	2,630
May 4	do	6.08	6,080	Sept. 13	do	3.84	1,690
June 9	R. B. Kilgore	7.51	10,100				

[a] Engineers, U. S. Reclamation Service. [b] Special deputy of State engineer.

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Daily discharge, in second-feet, of Boise River at Dowling's ranch, near Arrowrock, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,000	647	621	968	1,190	1,100	942	5,980	4,270	4,160	2,630	2,400
2	1,000	654	608	1,030	1,210	1,100	1,580	5,980	4,160	3,950	2,630	2,400
3	942	660	621	1,030	1,140	1,100	1,900	6,110	4,850	3,950	2,550	2,320
4	884	660	621	1,040	1,130	322	1,900	6,110	5,340	3,850	2,550	2,170
5	876	673	621	1,040	1,140	227	1,900	6,110	6,390	3,740	2,550	2,030
6	892	687	491	1,040	1,150	227	1,900	6,950	7,980	3,540	2,400	2,030
7	751	708	480	1,040	1,150	238	2,470	7,680	8,290	3,640	2,320	1,980
8	716	716	362	1,040	1,150	235	2,890	8,130	9,070	3,740	2,320	1,980
9	716	716	344	1,070	1,150	181	2,890	8,130	10,100	3,640	2,320	1,900
10	708	716	318	1,070	1,160	184	4,060	7,530	11,100	3,540	2,400	1,900
11	647	716	265	1,030	1,160	188	4,850	7,380	11,400	3,440	2,400	1,830
12	513	723	213	1,040	1,140	195	4,970	7,240	11,400	3,440	2,400	1,770
13	530	723	188	1,040	1,080	198	4,970	7,240	11,800	3,350	2,400	1,700
14	547	723	129	1,050	1,080	202	4,970	7,240	11,800	3,250	2,470	1,640
15	513	716	20	1,060	1,080	202	4,970	6,530	10,700	3,350	2,470	1,510
16	423	716	112	1,060	1,080	977	4,970	6,110	9,070	3,350	2,550	1,370
17	293	716	188	1,060	1,080	1,110	4,970	5,340	8,130	3,250	2,550	1,260
18	314	74	177	1,070	1,080	1,150	4,500	4,390	7,680	3,160	2,550	1,310
19	331	744	88	1,080	1,090	908	3,850	3,950	7,530	3,160	2,470	1,380
20	344	513	74	1,090	1,080	737	3,850	3,950	7,090	3,160	2,400	1,380
21	357	577	76	1,130	1,080	744	3,850	3,950	6,810	3,160	2,240	1,360
22	366	608	553	1,130	1,090	766	3,950	3,950	6,810	3,160	2,100	1,360
23	380	701	843	1,140	1,090	774	4,620	3,950	6,810	3,070	2,100	1,310
24	362	701	868	1,140	1,100	797	5,720	3,950	6,530	3,070	2,030	1,260
25	371	701	235	1,140	1,100	812	5,980	3,950	5,460	3,070	2,030	1,250
26	418	716	542	1,140	1,100	835	5,980	3,950	4,730	2,980	2,030	1,240
27	496	716	667	1,140	1,100	859	5,980	4,160	4,390	2,890	2,030	1,220
28	553	716	20	1,140	1,100	884	5,980	4,160	4,060	2,720	2,100	1,200
29	571	723	74	1,150	.....	900	5,980	4,500	3,950	2,720	2,240	1,180
30	577	371	640	1,150	.....	908	5,980	4,500	3,850	2,800	2,240	1,160
31	608	.....	900	1,150	.....	925	.....	4,390	.....	2,720	2,400	.....

NOTE.—Discharge estimated Dec. 15 and 28; water surface below gage.

Monthly discharge of Boise River at Dowling's ranch, near Arrowrock, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,000	293	581	35,700
November	744	74	658	39,200
December	900	20	386	23,700
January	1,150	968	1,080	66,400
February	1,210	1,080	1,120	62,200
March	1,150	181	645	39,700
April	5,980	942	4,110	245,000
May	8,130	3,950	5,600	344,000
June	11,800	3,850	7,380	439,000
July	4,160	2,720	3,320	204,000
August	2,630	2,030	2,350	144,000
September	2,400	1,160	1,630	97,000
The year	11,800	20	2,400	1,740,000

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COTTONWOOD CREEK NEAR ARROWROCK, IDAHO.

LOCATION.—In sec. 35, T. 4 N., R. 5 E., Boise County, 200 feet above bridge where Twin Springs-Arrowrock road crosses creek, a quarter of a mile north of south boundary of Boise National Forest, 1½ miles above mouth of creek, and 13 miles from Arrowrock by road.

DRAINAGE AREA.—23 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 7, 1914, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff in stilling well installed September 29, 1916, to replace vertical staff fastened to large cottonwood on left bank used previously; read by Mrs. Eldora Hedrick. From May 19 to July 4, 1916, readings were made on temporary vertical staff about 6 feet downstream. All gages referred to same datum.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Reinforced concrete control 15 feet below gage installed October 24, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.77 feet at 6 p. m. March 27 (discharge, 65 second-feet); minimum stage, 0.64 foot September 7 and 8 (discharge, 0.4 second-foot).

1914–1918: Maximum stage recorded, 2.30 feet at 4 p. m. April 26, 1917 (discharge, 166 second-feet); minimum stage, 0.64 foot September 7 and 8, 1918, and 0.03 foot (on original gage) August 12–15, 1915 (discharge, 0.4 second-foot).

ICE.—Records discontinued during winter.

DIVERSIONS.—No important diversions above gage. One small diversion at brush dam 250 feet below.

REGULATION.—No artificial regulation.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Cottonwood Creek near Arrowrock, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 17	H. J. Dean	0.84	2.1	June 5	R. B. Kilgore	1.17	11.6
Mar. 24	C. F. Elford	1.62	47.7	July 24	do	.77	1.3

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Daily discharge, in second-feet, of Cottonwood Creek near Arrowrock, Idaho, for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.0	51	30	9.5	2.9	1.3	0.6
2	9.5	48	36	10	2.7	2.5	.6
3	9.5	42	38	11	2.5	2.0	.6
4	11	37	35	11	2.4	1.3	.6
5	12	34	33	12	2.2	1.2	.5
6	13	31	31	9.9	2.2	1.2	.5
7	11	30	31	11	2.0	1.0	.4
8	11	29	35	9.5	1.8	1.0	19
9	11	39	31	9.5	1.8	.9	5.0
10	11	45	26	8.6	1.8	.9	3.4
11	12	43	24	8.3	1.5	.9	2.9
12	14	43	24	8.0	1.5	.9	3.9
13	13	47	24	7.4	1.5	.7	3.2
14	14	42	24	7.4	1.5	.8	3.0
15	14	36	22	7.0	1.5	1.0	2.9
16	14	33	21	6.7	1.5	1.2	2.5
17	15	31	19	6.1	1.5	1.3	2.2
18	30	31	19	5.8	1.5	1.2	1.8
19	44	31	18	5.5	1.5	1.0	1.7
20	43	31	17	5.5	1.4	1.0	1.5
21	45	31	16	7.0	1.3	1.0	1.5
22	44	31	15	6.1	1.3	1.0	1.5
23	45	31	15	5.5	1.2	1.0	3.2
24	48	31	14	5.5	1.2	1.1	2.9
25	48	32	14	5.5	1.2	1.1	2.2
26	55	34	14	5.5	1.3	1.1	1.7
27	63	31	16	5.3	1.3	1.0	1.5
28	62	31	14	5.0	1.2	.8	1.5
29	56	31	13	4.6	1.2	.7	1.5
30	53	31	13	3.0	1.2	.6	2.2
31	51	.....	12	.....	1.2	.6	.....

NOTE.—Discharge estimated June 2–4.

Monthly discharge of Cottonwood Creek near Arrowrock, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March	63	8.0	28.7	1,760
April	51	29	35.6	2,120
May	38	12	22.4	1,380
June	12	3.0	7.42	442
July	2.9	1.2	1.64	101
August	2.5	.6	1.07	65.8
September	19	.4	2.55	152
The period	.....	.....	.....	6,020

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SOUTH FORK OF BOISE RIVER NEAR LENOX, IDAHO.[1]

LOCATION.—In sec. 24, T. 2 N., R. 6 E., in canyon at R. S. Sandlin's ranch, 1 mile above mouth of Smith Creek, 4 miles above flow line of Arrowrock reservoir, 14 miles above mouth of South Fork, 18 miles above Arrowrock dam, and 7 miles south of Lenox post office, Elmore County.

DRAINAGE AREA.—1,090 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 24, 1911, to September 30, 1918.

GAGE.—Friez water-stage recorder on right bank in wooden shelter, referenced to inside and outside vertical staff gages; installed April 11, 1915, at same datum but about 25 feet below original inclined gage. Records from March 24, 1911, to April 10, 1915, refer to the inclined gage. R. S. Sandlin, observer.

DISCHARGE MEASUREMENTS.—Made from cable about 100 feet above gage, or by wading at a section about 150 feet below gage.

CHANNEL AND CONTROL.—Bed of stream consists of mud and gravel. Control of coarse gravel and rock; practically permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 7.33 feet at 11 a. m. June 13 (discharge, 5,040 second-feet); minimum stage, 2.28 feet for entire day September 3 (discharge, 293 second-feet).

1911–1918: Maximum stage recorded, 9.53 feet at 11 a. m. May 15, 1917 (discharge, 9,200 second-feet); minimum stage, 1.94 feet at 1 p. m. December 16, 1915 (discharge, 197 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—No important diversions above gage, and none below.

REGULATION.—No artificial regulation.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by applying to rating table mean gage height obtained by inspecting recorder graph and by interpolating for days of no gage height. Records fair during winter and excellent during remainder of year.

Discharge measurements of South Fork of Boise River near Lenox, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 26	C. F. Elford	4.59	1,510
June 7	R. B. Kilgore	6.46	4,060
July 25	.....do	3.10	596

[1] Formerly designated "South Fork of Boise River near Prairie, Idaho."

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Daily discharge, in second-feet, of South Fork of Boise River near Lenox, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	353	363	734	788	350	425	2,370	2,590	2,110	1,090	449	368
2	350	363	609	723	410	418	2,210	2,760	2,210	1,020	490	299
3	346	363	418	667	429	445	1,830	3,010	2,320	992	469	293
4	340	370	327	672	429	453	1,660	3,540	2,700	931	437	296
5	337	370	388	647	445	441	1,450	3,990	3,010	902	410	296
6	333	367	410	586	445	392	1,370	3,840	3,540	872	395	296
7	330	367	388	581	422	416	1,340	3,540	3,690	815	392	299
8	330	363	360	577	399	441	1,370	3,400	3,840	776	385	308
9	333	363	381	537	370	465	1,660	3,140	4,140	844	374	662
10	330	363	392	380	374	445	2,210	2,760	4,300	844	367	511
11	330	363	377	407	407	453	2,320	2,530	4,470	776	356	441
12	330	367	374	586	449	485	2,370	2,370	4,470	728	350	410
13	330	370	449	550	465	490	2,480	2,370	4,810	687	346	388
14	333	370	498	519	441	453	2,380	2,530	4,640	707	343	407
15	333	367	477	506	418	433	2,280	2,590	4,140	771	360	515
16	333	374	418	502	426	453	2,180	2,480	3,400	697	388	473
17	330	367	414	490	445	485	2,080	2,260	3,140	647	414	418
18	330	353	449	498	437	528	1,980	2,110	2,950	619	409	395
19	330	340	485	490	399	623	1,880	1,970	2,880	591	405	385
20	346	333	498		346	718	1,780	1,880	2,640	581	400	374
21	343	333	481	480	392	810	2,020	1,880	2,700	554	395	367
22	343	374	445		410	872	2,320	1,920	2,590	541	390	363
23	346	377	609		457	992	2,530	1,970	2,760	528	386	367
24	343	367	734	469	449	1,190	2,640	2,060	2,320	511	381	403
25	340	370	643	511	395	1,370	2,700	2,160	2,020	577	367	426
26	350	367	628	400		1,570	2,530	2,160	1,780	554	353	407
27	356	340	760		400	1,880	2,210	2,160	1,610	523	337	392
28	343	333	1,090	407		1,830	2,110	2,060	1,430	506	327	381
29	330	437	1,160	433	.....	1,780	2,210	1,920	1,260	481	324	374
30	330	485	1,060	433	.....	1,920	2,420	1,880	1,160	461	321	395
31	370	.....	902	400	.....	2,210	.....	2,020	.....	449	314	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated from observer's notes and weather records. Discharge estimated or interpolated Oct. 28, Jan. 10, 31, Feb. 1, 2, Mar. 1, 7, 8, Apr. 14-19, June 27, 28, and Aug. 18-23.

Monthly discharge of South Fork of Boise River near Lenox, Idaho, for the year ending Sept. 30, 1918.

[Drainage area, 1,090 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	370	330	339	0.311	0.36	20,800
November	485	333	368	.338	.38	21,900
December	1,160	327	560	.514	.59	34,400
January	788	380	519	.476	.55	31,900
February	465	346	415	.381	.40	23,000
March	2,210	392	835	.766	.88	51,300
April	2,700	1,340	2,100	1.93	2.15	125,000
May	3,990	1,880	2,510	2.30	2.65	154,000
June	4,810	1,160	2,970	2.72	3.04	177,000
July	1,090	449	696	.639	.74	42,800
August	490	314	382	.350	.40	23,500
September	662	293	388	.356	.40	23,100
The year	4,810	293	1,010	.927	12.54	729,000

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MOORE CREEK NEAR ARROWROCK, IDAHO.

LOCATION.—In sec. 21, T. 3 N., R. 4 E., Boise County, a quarter of a mile above highway bridge on Boise-Arrowrock road, half a mile above mouth, and 5 miles southwest of Arrowrock.

DRAINAGE AREA.—426 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1918 (discharge measurements only, prior to December 1, 1915).

GAGE.—Graduations to feet and tenths chiseled on face of rock ledge on left bank of stream and marked with white paint; read by A. P. Webb.

DISCHARGE MEASUREMENTS.—Made by wading near gage or from highway bridge a quarter of a mile below.

CHANNEL AND CONTROL.—Bed consists of boulders and sand. Control shifts frequently owing to deposition of sand in low stages and cutting out in high stages. Stream usually carries much sand and silt as a result of placer operations in Idaho Basin. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.40 feet at 8.30 a. m. March 27 (discharge, 2,170 second-feet); minimum stage recorded, 0.78 foot September 5-7 (discharge, 29 second-feet).

1915-1918: Maximum stage, 6.3 feet April 11, 1916 (discharge, 3,140 second-feet); minimum stage recorded, 0.67 foot August 30, 1915 (measured discharge, 17.8 second-feet).

ICE.—Stage-discharge relation only slightly affected by ice, owing to hot springs just above station.

DIVERSIONS.—No important diversions above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; bed of stream changes constantly between narrow limits. Two well-defined rating curves used, one from October 1 to March 20 and the other for remainder of year. Gage read to half-tenths once daily during high water and to hundredths during low water. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Several discharge measurements made by employees of United States Reclamation Service.

Discharge measurements of Moore Creek near Arrowrock, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 20	H. J. Dean	1.17	52.9	July 6	Tallman and Wheeler [a]	1.50	113
Mar. 9	Baldwin and Steward [a]	2.45	277	9	Steward and Tallman [b]	1.48	105
23	C. F. Elford	4.45	1,270	27	R. B. Kilgore	1.09	56.9
30	do	4.78	1,520	Aug. 2	Tallman and Steward	.98	51.3
June 8	R. B. Kilgore	3.05	466	Sept. 13	Steward and Tallman	1.08	47.0

[a] Engineer, U. S. Reclamation Service. [b] Special deputy of State engineer.

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Daily discharge, in second-feet, of Moore Creek near Arrowrock, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	54	73	266	580	101	223	1,580	700	412	150	45	30
2	54	69	203	536	203	223	1,400	700	396	168	45	30
3	54	69	149	488	223	244	1,150	874	412	142	52	30
4	54	80	132	440	244	244	1,080	1,010	445	126	42	30
5	54	80	132	392	244	244	939	1,080	445	118	38	29
6	54	83	124	338	244	244	1,080	1,080	480	110	38	29
7	54	84	108	364	244	255	939	1,010	538	102	36	29
8	54	84	101	338	223	266	939	1,010	499	95	34	64
9	49	84	116	313	223	278	939	874	538	102	34	81
10	49	83	116	223	203	278	1,400	754	538	110	34	62
11	49	84	101	184	244	301	1,310	650	538	102	34	57
12	49	84	116	203	266	364	1,230	700	445	88	34	52
13	49	84	203	244	289	378	1,230	700	480	81	34	52
14	54	84	423	244	266	313	1,150	700	445	81	32	81
15	54	84	266	244	244	338	1,080	700	396	81	38	110
16	54	84	203	266	244	338	939	650	366	74	47	81
17	54	87	203	244	266	378	874	626	352	68	52	68
18	54	87	378	266	244	495	812	581	312	68	68	68
19	54	87	313	266	234	1,000	812	559	300	68	57	62
20	54	73	364	213	203	1,150	812	559	277	62	62	62
21	54	70	289	203	234	1,230	812	538	266	57	57	57
22	60	68	255	184	244	1,230	874	480	244	57	57	57
23	60	76	423	223	266	1,230	874	445	255	54	57	74
24	60	94	737	223	266	1,400	874	428	255	52	57	126
25	66	98	423	289	234	1,480	874	445	255	52	52	88
26	69	98	458	313	223	1,670	812	445	214	57	47	81
27	69	87	1,310	313	234	2,170	754	480	177	55	47	74
28	73	101	1,480	289	234	1,960	700	480	168	52	40	74
29	73	132	1,230	266	.....	1,760	700	445	168	52	34	74
30	60	166	929	255	.....	1,580	700	412	159	47	32	81
31	73	.....	680	234	.....	1,670	.....	412	.....	45	30	.....

NOTE.—Discharge interpolated Jan. 3 and 4.

Monthly discharge of Moore Creek near Arrowrock, Idaho, for the year ending Sept. 30, 1918.

[Drainage area, 426 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	73	49	57.2	0.134	0.15	3,530
November	166	68	87.2	.205	.23	5,190
December	1,480	101	395	.927	1.07	24,200
January	580	184	296	.695	.80	18,200
February	289	101	235	.552	.57	13,100
March	2,170	223	804	1.89	2.18	49,400
April	1,580	700	989	2.32	2.59	58,800
May	1,080	412	662	1.55	1.79	40,700
June	538	159	359	.843	.94	21,400
July	168	45	83.1	.195	.22	5,110
August	68	30	44.1	.104	.12	2,710
September	126	29	63.1	.148	.17	3,750
The year	2,170	29	340	.798	10.83	246,000

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MALHEUR RIVER NEAR NAMORF, OREG.

LOCATION.—In sec. 2, T. 21 S., R. 40 E., at F. J. Froman's ranch, 1 mile south of east portal of tunnel No. 1 on Oregon & Eastern Railroad, 3 miles west of Namorf flag station, and 15 miles west of Harper post office, Malheur County. North Fork of Malheur River enters near Juntura, 20 miles above.

DRAINAGE AREA.—2,560 square miles (measured on General Land Office map).

RECORDS AVAILABLE.—May 24, 1913, to September 30, 1918.

GAGE.—Inclined staff on right bank, 300 feet above Froman's house; read by F. J. Froman. Datum raised 1.53 feet August 17, 1918.

DISCHARGE MEASUREMENTS.—Made by wading or from flume 400 feet above gage.

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel; practically permanent. Control 400 feet downstream; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.6 feet at 3 p. m. March 20 (discharge, 1,410 second-feet); minimum stage recorded, 2.25 feet August 5 to 8 (discharge, 20 second-feet).

1913–1918: Maximum stage, 10.7 feet February 6, 1916 (discharge indeterminate on account of ice jam); maximum stage recorded during open water, 9.1 feet during night of February 7, 1916 (discharge, 8,450 second-feet). Minimum discharge, 15 second-feet August 8 to 10, 1914 (gage height, 2.40 feet). Highest stage in recent years 11.3 feet, March 1, 1910, determined by leveling to high-water marks pointed out by F. J. Froman June 4, 1918 (discharge estimated from extension of rating curve, 12,600 second-feet). Floods of March 7 and 9, 1894, are said to have been about 0.3 foot higher.

ICE.—Stage-discharge relation only slightly affected by ice during year.

DIVERSIONS.—Many small diversions from river and tributaries above gage, largest being near Drewsey and from North Fork near Beulah.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by change of datum August 17. Rating curve well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Malheur River near Namorf, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 3	F. F. Henshaw	2.81	103	Aug. 14	R. C. Briggs	2.29	22.5
4	do	2.84	116	17	do	2.33	24.2

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Daily discharge, in second-feet, of Malheur River near Namorf, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	68	103	165	237	150	165	833	251	129	56	23	32
2	78	103	172	214	100	172	786	237	119	52	23	30
3	78	109	180	193	150	193	786	223	109	47	22	34
4	74	109	180	193	170	206	543	223	109	44	22	34
5	74	109	172	193	193	237	476	251	109	42	20	32
6	74	103	165	193	237	214	476	251	103	42	20	32
7	74	103	142	206	269	206	476	284	98	38	20	32
8	74	119	165	237	307	142	476	298	98	34	20	32
9	78	129	165	223	273	214	476	284	98	32	23	41
10	78	135	165	165	359	214	476	269	98	359	23	46
11	78	135	152	193	193	223	476	269	98	103	23	46
12	78	129	165	180	206	214	510	251	98	59	25	51
13	78	129	165	214	214	223	543	237	103	56	26	55
14	78	135	165	206	193	237	476	223	98	38	23	58
15	78	135	165	206	193	214	476	223	98	32	26	78
16	78	135	165	206	172	206	446	214	83	32	26	97
17	78	135	165	206	206	307	415	223	78	32	26	78
18	78	142	172	214	172	348	415	237	83	28	28	86
19	78	135	165	206	193	980	415	223	74	28	32	91
20	78	135	165	180	165	1,240	317	206	68	25	36	86
21	83	135	172	142	180	1,140	284	206	63	25	43	78
22	83	129	172	152	172	786	284	193	59	23	46	82
23	98	135	180	152	172	742	284	180	63	23	43	91
24	103	135	180	180	180	698	284	172	74	23	41	266
25	103	142	193	193	214	658	298	165	74	23	36	203
26	103	142	206	206	135	698	298	154	63	23	36	194
27	103	142	214	193	172	786	298	154	56	23	34	139
28	103	152	214	165	193	980	274	154	56	23	33	102
29	103	165	214	193	.....	786	260	142	56	23	33	120
30	103	172	237	193	.....	833	251	135	56	22	32	163
31	103	.....	260	190	.....	786	.....	129	.....	22	32	.....

NOTE.—Stage-discharge relation affected by ice Jan. 31 to Feb. 4; discharge estimated.

Monthly discharge of Malheur River near Namorf, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	103	68	84.5	5,200
November	172	103	131	7,800
December	260	142	179	11,000
January	237	142	194	11,900
February	359	100	196	10,900
March	1,240	165	485	29,800
April	833	251	437	26,000
May	298	129	215	13,200
June	129	56	85.7	5,100
July	359	22	46.2	2,840
August	46	20	28.9	1,780
September	266	30	83.6	4,970
The year	1,240	20	180	130,000

SOUTH FORK OF BURNT RIVER AT HARDMAN RANCH, NEAR UNITY, OREG.

LOCATION.—In NW. ¼ sec. 27, T. 13 S., R. 36 E., at ranch of J. R. Hardman, 8 miles southwest of Unity, Baker County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 13, 1916, to September 30, 1918.

GAGE.—Vertical staff on upstream end of right abutment of private wagon bridge; read by O. M. Hardman.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

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CHANNEL AND CONTROL.—Control at broad gravel riffle; slightly shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.3 feet April 1 and 2 (discharge, 45 second-feet); minimum stage recorded, 0.61 foot September 15–19 (discharge, 11 second-feet—including Fleetwood ditch, 13 second-feet).

1916–1918: Maximum stage recorded, 1.7 feet May 15, 1917 (discharge, 83 second-feet); minimum stage occurred in 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Eldorado ditch diverts water from most of the tributaries of South Fork above station and carries it over Beam Creek divide into Willow Creek where it is used for irrigation. This ditch carries water during the spring until May 1. Fleetwood ditch diverts water past gage during irrigation season (see p. 152).

REGULATION.—None.

ACCURACY.—Stage-discharge relation somewhat shifting. Well-defined rating curve used except Oct. 1–8 and June 1 to July 15 when indirect method for shifting control was used. Gage read to quarter-tenths once daily. Daily discharge ascertained by applving daily gage height to rating table except for above periods. Records good.

Discharge measurements of South Fork of Burnt River at Hardman ranch, near Unity, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 24	F. F. Henshaw	0.95	21.5	May 29	F. F. Henshaw	0.86	21.4
Mar. 29	C. L. Batchelder	1.22	38.8	Aug. 22	R. C. Briggs	.77	15.7
29	do	1.23	39.3				

Daily discharge, in second-feet, of South Fork of Burnt River at Hardman ranch, near Unity, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	22	24	24	24	25	45	36	21	18	14	13
2	20	22	22	24	24	25	45	36	21	18	14	13
3	20	22	22	24	24	25	43	36	21	18	14	13
4	20	22	22	24	24	25	40	37	21	18	14	13
5	22	22	22	24	24	25	37	37	21	18	14	12
6	22	22	22	24	24	25	36	37	21	18	15	12
7	22	22	22	22	24	25	34	37	20	17	15	12
8	22	22	22	22	24	25	34	37	20	14	16	12
9	22	22	22	22	24	25	34	36	20	14	16	12
10	22	22	22	22	24	25	34	36	20	15	16	12
11	24	22	22	22	24	25	34	36	19	15	16	12
12	24	22	22	22	24	25	34	36	19	15	16	12
13	24	22	24	22	24	26	34	36	19	14	16	12
14	24	22	24	22	24	26	31	36	19	14	16	12
15	22	22	24	22	24	26	31	36	19	14	16	11
16	22	22	24	22	24	26	31	36	19	16	16	11
17	22	22	24	22	24	26	33	36	19	16	18	11
18	22	22	24	22	24	26	31	36	19	18	16	11
19	22	22	24	22	24	28	30	25	19	18	17	11
20	22	22	24	22	24	28	30	25	19	18	18	13
21	22	22	24	22	24	28	28	25	19	18	18	13
22	22	22	24	22	24	30	28	25	19	18	15	13
23	22	22	24	22	24	30	27	22	19	16	15	13
24	22	22	24	22	24	34	27	22	18	17	14	12
25	22	22	24	22	25	37	27	22	18	15	14	12
26	22	22	24	22	25	37	27	22	17	15	16	12
27	22	22	24	24	25	36	27	22	17	15	16	12
28	22	22	24	24	25	36	27	22	17	15	14	12
29	22	22	24	24	.....	40	27	22	17	15	13	12
30	22	24	24	24	.....	43	27	22	18	14	13	12
31	22	.....	24	24	.....	43	.....	21	.....	14	13	.....

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Monthly discharge of South Fork of Burnt River at Hardman ranch, near Unity, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	24	20	22.0	1,350
November	24	22	22.1	1,320
December	24	22	23.3	1,430
January	24	22	22.7	1,400
February	25	24	24.1	1,340
March	43	25	29.2	1,800
April	45	27	32.4	1,930
May	37	21	30.6	1,880
June	21	17	19.2	1,140
July	18	14	16.1	990
August	18	13	15.3	941
September	13	11	12.1	720
The year	45	11	22.4	16,200

Combined monthly discharge of South Fork of Burnt River and Fleetwood ditch at Hardman ranch, near Unity, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	24	20	22.0	1,350
November	24	22	22.1	1,320
December	24	22	23.3	1,430
January	24	22	22.7	1,400
February	25	24	24.1	1,340
March	43	25	29.2	1,800
April	45	31	34.6	2,060
May	47	29	40.0	2,460
June	28	24	26.1	1,550
July	25	18	21.5	1,320
August	24	15	20.5	1,260
September	15	13	13.8	821
The year	47	13	25.0	18,100

FLEETWOOD DITCH NEAR UNITY, OREG.

LOCATION.—In NW. ¼ sec. 27, T. 13 S., R. 36 E., opposite gage on South Fork of Burnt River.

RECORDS AVAILABLE.—April 1 to September 30, 1918.

GAGE.—Vertical staff driven in ditch bank; location changed May 29.

DISCHARGE MEASUREMENTS.—Made from wagon bridge or by wading.

CHANNEL AND CONTROL.—Control somewhat shifting owing to small size of ditch and loose earth banks.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.4 feet May 1–3, 5, 6, 9–14, and 18 (discharge, 10 second-feet); minimum discharge, 0.38 foot April 6–13 (discharge, estimated 0.1 second-foot).

ICE.—No record during ice period.

ACCURACY.—Stage-discharge relation changed May 29 by relocation of gage. Rating curve used to May 29, poorly defined; for June 1 to September 30, fairly well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Fleetwood (or Lancaster) ditch diverts water from South Fork of Burnt River in NW. ¼ sec. 27, a few hundred yards above river gage and irrigates about 600 acres of land near Unity.

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Discharge measurements of Fleetwood ditch near Unity, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.		Discharge.	Date.	Made by—	Gage height.		Discharge.
		Old gage.	New gage.				Old gage.	New gage.	
		Feet.	*Feet.*	*Sec.-ft.*			*Feet.*	*Feet.*	*Sec.-ft.*
Mar. 29	C. L. Batchelder...	0.50	0.02	0.35	Aug. 22	R. C. Briggs.....	.....	0.70	6.4
May 29	F. F. Henshaw....	1.29	.74	7.9	25	.....do.....	.....	.56	3.2

Daily discharge, in second-feet, of Fleetwood ditch near Unity, Oreg., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.4	10	7.2	7.2	4.0	1.9	16	1.2	10	7.2	5.5	6.5	2.2
2	.4	10	7.2	7.2	4.5	2.1	17	1.4	10	7.2	5.5	6.5	2.2
3	.4	10	7.2	7.2	4.5	2.1	18	1.2	10	6.5	5.0	6.5	2.2
4	.4	8	7.2	7.2	4.5	2.1	19	.8	8	6.5	5.0	6.0	2.2
5	.4	10	7.2	7.2	4.5	2.3	20	.8	8	6.5	5.0	6.0	.8
6	.1	10	6.5	6.5	5.0	2.3	21	4.5	8	6.5	4.0	6.5	.8
7	.1	9	6.5	6.5	5.0	2.3	22	4.5	8	6.5	4.5	6.5	.8
8	.1	8	6.5	6.5	6.0	2.3	23	6.0	9	6.5	4.5	6.5	.8
9	.1	10	7.2	6.5	6.0	2.3	24	6.0	10	6.5	5.0	6.5	.8
10	.1	10	7.2	6.0	6.0	2.3	25	6.0	10	6.5	5.0	6.0	.8
11	.1	10	7.2	5.5	6.0	2.2	26	6.0	9	6.5	4.5	3.3	.8
12	.1	10	7.2	5.5	6.0	2.2	27	6.0	9	6.5	4.5	3.3	.7
13	.1	10	7.2	5.5	6.5	2.2	28	6.0	10	7.2	4.5	3.0	.7
14	1.2	10	7.2	5.0	6.5	2.2	29	6.0	9	7.2	4.5	2.6	.7
15	1.2	10	7.2	5.0	6.5	2.3	30	4.5	8	7.2	4.5	2.6	.7
							31	.....	8	.....	4.0	2.1	.....

Monthly discharge of Fleetwood ditch near Unity, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April	6.0	0.1	2.20	131
May	10	8	9.3	572
June	7.2	6.5	6.90	411
July	7.2	4.0	5.48	337
August	6.5	2.1	5.22	321
September	2.3	.7	1.68	100
The period	.....	.....	.....	1,870

GRANDE RONDE RIVER AT LA GRANDE, OREG.

LOCATION.—In SW. ¼ sec. 31, T. 2, S., R. 38 E., a quarter of a mile above bridge on river road, half a mile northwest of La Grande, Union County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 16 to September 30, 1918.

GAGE.—Inclined staff on right bank; read by K. L. Myrick.

DISCHARGE MEASUREMENTS.—Made from Orodell Bridge below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel. Control is formed by remains of an old dam; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 7.28 feet March 26 (discharge, 2,540 second-feet); minimum stage recorded, 2.32 feet September 4 and 5 (discharge, 16 second-feet).

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ICE.—No record during ice period.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Field data furnished by Grande Ronde drainage district.

Discharge measurements of Grande Ronde River at La Grande, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 17	Rhea Luper [a]	4.33	471	Apr. 19	Rhea Luper	4.85	766
Mar. 19	do	5.75	1,280	Aug. 30	R. C. Briggs	2.37	20.8
30	do	6.74	2,060				

[a] Engineer for Grande Ronde drainage district.

Daily discharge, in second-feet, of Grande Ronde River at La Grande, Oreg., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		290	1,960	940	290	81	44	19
2		395	1,640	940	275	74	31	18
3		360	1,200	1,000	245	69	33	18
4		290	1,200	1,130	260	66	31	16
5		308	1,060	1,060	260	64	29	16
6		325	880	880	275	61	28	17
7		360	940	820	275	56	25	18
8		342	880	760	260	54	31	18
9		325	1,340	660	260	56	32	18
10		308	1,560	560	275	61	29	23
11		260	1,560	515	245	60	27	29
12		325	1,480	515	360	66	23	22
13		415	1,340	515	245	56	23	29
14		395	1,270	515	205	50	22	50
15		415	1,060	515	180	59	22	56
16	515	515	940	515	158	76	25	51
17	475	710	880	515	180	59	33	37
18	515	1,270	760	560	137	50	37	33
19	395	1,270	710	435	128	41	45	30
20	360	1,340	610	475	118	33	61	28
21	230	1,270	710	360	118	44	55	28
22	378	1,640	880	342	109	37	49	28
23	395	1,880	1,000	342	192	35	43	29
24	325	2,120	1,340	308	180	97	37	29
25	260	2,540	1,060	308	118	84	33	31
26	360	2,540	940	290	109	69	32	28
27	325	2,120	820	325	100	59	28	27
28	230	1,800	820	308	97	54	23	28
29		1,800	820	308	92	51	22	30
30		2,120	880	308	87	44	21	33
31		2,040		308		37	20	

NOTE.—Discharge interpolated Aug. 31, Sept. 1, 2, 19, 23, and 29.

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Monthly discharge of Grande Ronde River at La Grande, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 16-28	515	230	366	9,440
March	2,540	260	1,040	64,000
April	1,960	610	1,080	64,300
May	1,130	290	559	34,400
June	360	87	194	11,500
July	97	33	58.2	3,580
August	61	20	32.1	1,970
September	56	16	27.9	1,660
The period				191,000

GRANDE RONDE RIVER AT ELGIN, OREG.

LOCATION.—In NW. ¼ sec. 14, T. 1 N., R. 39 E., at county bridge a quarter of a mile east of railroad station at Elgin, Union County, at lower end of Grande Ronde Valley, just below mouth of Phillips Creek.

DRAINAGE AREA.—1,350 square miles.

RECORDS AVAILABLE.—November 18, 1903, to August 15, 1912; March 27 to September 21, 1918.

GAGE.—Chain gage on downstream side of bridge near east abutment; read by J. W. Bickford. Present gage not referred to datum of earlier gage.

DISCHARGE MEASUREMENT.—Made from highway bridge a quarter of a mile above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of heavy gravel and small boulders; fairly permanent. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year, 7.5 feet prior to March 28, determined from high-water marks (discharge, 5,370 second-feet); minimum stage recorded, probably close to actual minimum, 2.27 feet August 30 (discharge, 75 second-feet).

1903-1912 and 1918: Maximum stage recorded 8.1 feet March 22, 1910 (discharge, 9,220 second-feet); minimum discharge, 15 second-feet, August 29, 1905 (gage height, 1.3 feet). The flood of 1917 reached a stage of 10.3 feet (discharge estimated from extension of rating curve, 10,500 second-feet).

ICE.—No record during ice period.

DIVERSIONS.—Considerable area irrigated in Grande Ronde Valley above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during season. Rating curve fairly well defined. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Part of field data furnished by Grande Ronde drainage district.

Discharge measurements of Grande Ronde River at Elgin, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 13	Henshaw and Luper		1,660	Apr. 22	Rhea Luper	5.03	1,810
Mar. 28	Rhea Luper [a]	6.87	4,330	Aug. 31	R. C. Briggs	2.27	75
Apr. 6	do	5.54	2,520				

[a] Engineer, Grande Ronde drainage district.

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Daily discharge, in second-feet, of Grande Ronde River at Elgin, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	June.	Sept.	Day.	Mar.	Apr.	May.	June.	Sept.
1	.....	.....	2,050	680	80	16	.....	2,540	1,320	.....	80
2	.....	.....	2,050	610	80	17	.....	2,170	1,230	.....	80
3	.....	.....	2,170	610	80	18	.....	2,170	1,230	.....	80
4	.....	2,930	2,170	610	80	19	.....	2,050	1,230	.....	80
5	.....	2,540	2,290	610	80	20	.....	1,930	1,140	.....	80
6	.....	2,540	2,290	610	80	21	.....	1,820	1,060	.....	80
7	.....	2,170	2,290	610	80	22	.....	1,820	980	.....	.....
8	.....	2,050	2,170	610	80	23	.....	1,930	820	.....	.....
9	.....	2,410	2,170	680	80	24	.....	2,050	820	.....	.....
10	.....	2,540	1,930	680	80	25	.....	2,050	750	.....	.....
11	.....	2,670	1,710	680	80	26	.....	2,050	750	.....	.....
12	.....	2,800	1,600	750	80	27	4,550	2,050	750	.....	.....
13	.....	2,800	1,600	820	80	28	4,390	2,050	750	.....	.....
14	.....	2,800	1,500	.....	80	29	.....	2,050	750	.....	.....
15	.....	2,670	1,410	.....	80	30	.....	2,050	680	.....	.....
						31	.....	.....	680	.....	.....

NOTE.—No record obtained during periods for which no discharge is given.

Monthly discharge of Grande Ronde River at Elgin, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 4-30	2,930	1,820	2,290	123,000
May	2,290	680	1,430	87,900
June 1-13	820	610	658	17,000
September 1-21	80	80	80.0	3,330

LADD CREEK NEAR HOT LAKE, OREG.

LOCATION.—In NW. ¼ sec. 12, T. 4 S., R. 38 E., 3 miles southwest of Hot Lake, Union County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 20 to May 25, 1918, when station was discontinued.

GAGE.—Vertical staff on highway bridge, 600 feet above house of William Banton, gage reader.

DISCHARGE MEASUREMENTS.—Made from wagon bridge a short distance below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; fairly permanent. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.10 feet March 18 (discharge, 192 second-feet). No record of low water.

ICE.—None during period of record.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 120 second-feet. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Field data furnished by Grande Ronde drainage district.

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Discharge measurements of Ladd Creek near Hot Lake, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 20	Rhea Luper [a]	1.16	6.8	Apr. 21	Rhea Luper	1.37	36.2
Mar. 29	do	1.72	96	Aug. 30	R. C. Briggs	.43	1.4
Apr. 10	Luper and Lewis	1.63	78				

[a] Engineer, Grande Ronde drainage district.

Daily discharge, in second-feet, of Ladd Creek near Hot Lake, Oreg., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May.	Day.	Feb.	Mar.	Apr.	May.
1		10	114	29	16		103	58	7
2		7	103	27	17		114	54	7
3		11	82	24	18		192	54	7
4		12	92	24	19		114	58	7
5		8	92	22	20	19	92	63	7
6		7	63	20	21	20	126	58	7
7		7	54	19	22	12	138	54	6
8		8	63	17	23	10	126	43	6
9		8	72	15	24	10	164	43	5
10		10	96	14	25	10	178	40	5
11		40	92	12	26	8	164	40	
12		29	72	11	27	10	138	38	
13		27	63	10	28	8	126	34	
14		29	63	8	29		114	31	
15		54	63	8	30		138	29	
					31		126		

Monthly discharge of Ladd Creek near Hot Lake, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 20-28	20	8	11.9	212
March	192	7	78.1	4,800
April	114	29	62.7	3,730
May 1-25	29	5	13.0	645
The period				9,390

CATHERINE CREEK NEAR UNION, OREG.

LOCATION.—In SW. ¼ sec. 34, T. 4 S., R. 40 E., 5 miles southeast of Union, Union County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 21 to September 30, 1918; May 15, 1906, to May 18, 1907, at a station in sec. 3, T. 5 S., R. 40 E; July 20, 1911, to December 31, 1912, and March 20 to September 14, 1915, at a station in SW. ¼ sec. 1, T. 5 S., R. 40 E; practically same discharge at all three stations.

GAGE.—Vertical staff on right bank, opposite barn of E. H. Miles, observer.

DISCHARGE MEASUREMENTS.—Made from bridge above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; fairly permanent. No well-defined control.

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EXTREMES OF DISCHARGE.—Maximum stage recorded, 5.5 feet May 4 (discharge, 960 second-feet); minimum stage recorded, 2.05 feet, September 23–29 (discharge, 25 second-feet).

1906–7, 1911–12, 1915, and 1918: Maximum discharge recorded, 1,120 second-feet May 17, 1907 (gage height on first gage, 4.60 feet); minimum discharge (obtained as result of measurement January 13, 1913) 19.5 second-feet.

ICE.—No record during ice period.

DIVERSION.—Station above practically all irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation apparently permanent. Rating curve fairly well defined. Gage read to half-tenths once daily at low stages, and to tenths at high stages. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Catherine Creek near Union, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 29	Rhea Luper [a]	3.70	273	May 12	Rhea Luper	3.90	328
Apr. 10	do	4.22	434	Aug. 29	R. C. Briggs	2.10	28.3
21	do	3.67	264				

[a] Engineer, Grande Ronde drainage district.

Daily discharge, in second-feet, of Catherine Creek near Union, Oreg., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May.	June.	Aug.	Sept.	Day.	Feb.	Mar.	Apr.	May.	June.	Aug.	Sept.
1	.....	60	395	580	218	.....	28	16	.....	76	275	365	.....	.....	28
2	.....	65	365	740	245	.....	28	17	.....	82	245	335	.....	.....	32
3	.....	70	335	825	305	.....	28	18	.....	82	195	218	.....	.....	32
4	.....	70	305	960	335	.....	28	19	.....	122	195	218	.....	.....	32
5	.....	76	245	870	305	.....	28	20	.....	155	245	195	.....	.....	35
6	.....	82	138	700	395	.....	28	21	65	138	335	174	.....	.....	35
7	.....	94	155	540	430	.....	28	22	65	138	365	245	.....	.....	28
8	.....	82	174	500	500	.....	32	23	76	155	395	218	.....	.....	25
9	.....	82	305	500	540	.....	32	24	65	232	430	195	.....	.....	25
10	.....	70	580	365	660	.....	28	25	76	365	540	218	.....	.....	25
11	.....	70	500	305	700	.....	28	26	65	465	430	195	.....	.....	25
12	.....	76	540	335	620	.....	28	27	65	365	365	174	.....	.....	25
13	.....	70	540	365	580	.....	28	28	70	335	365	138	.....	.....	25
14	.....	70	412	395	465	.....	28	29	.....	275	395	122	.....	28	25
15	.....	70	335	430	335	.....	28	30	.....	365	540	218	.....	28	28
								31	.....	365	.....	335	.....	28	.....

NOTE.—No record obtained during periods for which no discharge is given.

Monthly discharge of Catherine Creek near Union, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 21–28	76	65	68.4	1,090
March	465	60	156	9,590
April	580	138	355	21,100
May	960	122	386	23,700
June 1–15	700	218	442	13,200
September	35	25	28.4	1,690

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LITTLE CREEK NEAR UNION, OREG.

LOCATION.—In NW. ¼ sec. 22, T. 4 S., R. 40 E., 4 miles east of Union, Union County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 21 to May 31, 1918; April 11 to September 14, 1915, at a station in sec. 14, about 1½ miles upstream.

GAGE.—Vertical staff on right bank; read by C. N. Cross.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; fairly permanent. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 4.8 feet May 2, 4, and 5 (discharge, 109 second-feet); no record of minimum discharge.

ICE.—No records during ice period.

DIVERSIONS.—Water is diverted for irrigating several small tracts above station.

REGULATION.—None.

ACCURACY.—Stage-discharge apparently changed from April 13 to 15. Two fairly well defined rating curves used. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except for the highest stages for which they are fair.

COOPERATION.—Field data furnished by Grande Ronde drainage district.

Discharge measurements of Little Creek near Union, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 21	Rhea Luper [a]	3.95	25.3	Apr. 21	Rhea Luper [a]	4.14	46
Mar. 29	do	4.32	56	Aug. 29	R. C. Briggs	[b] 3.46	2.2
Apr. 10	do	4.34	54				

[a] Engineer, Grande Ronde drainage district.
[b] Stage-discharge relation affected by backwater from dam.

Daily discharge, in second-feet, of Little Creek near Union, Oreg., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May.	Day.	Feb.	Mar.	Apr.	May.
1		22	60	77	16		22	58	77
2		29	56	109	17		36	51	72
3		22	52	98	18		44	51	67
4		22	52	109	19		52	51	58
5		36	48	109	20		52	51	58
6		32	36	98	21	26	52	47	51
7		32	36	98	22	29	56	43	51
8		17	36	98	23	44	52	58	51
9		22	69	87	24	26	60	67	51
10		20	52	77	25	22	60	67	51
11		22	60	67	26	17	69	67	51
12		22	60	77	27	17	79	58	51
13		20	67	87	28	20	60	67	51
14		22	69	87	29		60	67	51
15		22	62	82	30		52	77	67
					31		60		67

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Monthly discharge of Little Creek near Union, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 21-28	44	17	25.1	398
March	79	17	39.6	2,430
April	77	36	56.5	3,360
May	109	51	73.7	4,530
The period				10,760

MILL CREEK NEAR COVE, OREG.

LOCATION.—In NW. ¼ sec. 25, T. 3 S., R. 40 E., just below power plant of Eastern Oregon Light & Power Co. near Cove, Union County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 22 to May 26, 1918, when station was discontinued.

GAGE.—Vertical staff on left bank; read by Robert Arent.

DISCHARGE MEASUREMENTS.—Made from wagon bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; probably permanent. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.80 feet May 4 (discharge, 75 second-feet); no record of minimum discharge.

ICE.—None.

DIVERSIONS.—One small diversion for irrigation above station; pipe line of power plant diverts water but returns it above station.

REGULATION.—Operation of power plant may have caused some fluctuation in February and March.

ACCURACY.—Stage-discharge relation apparently permanent. Rating curve fairly well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Field data furnished by Grande Ronde drainage district.

Discharge measurements of Mill Creek near Cove, Oreg., during the year ending Sept. 30, 1918.

[Made by Rhea Luper.] [a]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Feb. 22	1.95	9.5
Mar. 29	2.32	28.9
Apr. 19	2.33	33.0

[a] Engineer, Grande Ronde drainage district.

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Daily discharge, in second-feet, of Mill Creek near Cove, Oreg., for the year ending Sept. 30, 1918.

Day.	Feb.	Mar.	Apr.	May.	Day.	Feb.	Mar.	Apr.	May.
1		14	45	54	16		14	37	54
2		14	41	54	17		14	39	50
3		9.5	33	64	18		16	29	50
4		14	33	75	19		22	33	41
5		11	29	64	20		22	37	37
6		5	26	64	21		22	37	33
7		11	33	64	22	9.5	26	45	37
8		11	33	59	23	11	26	45	37
9		14	45	64	24	8	29	45	33
10		8	45	54	25	14	45	45	33
11		19	45	59	26	11	45	45	29
12		16	45	54	27	11	37	41	
13		14	50	59	28	14	37	45	
14		14	41	54	29		33	45	
15		15	41	54	30		37	50	
					31		41		

Monthly discharge of Mill Creek near Cove, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 22-28	14	8.0	11.2	155
March	45	5.0	21.1	1,300
April	50	26	40.1	2,390
May 1-26	75	29	51.3	2,650
The period				6,500

STATE DITCH NEAR ALICEL, OREG.

LOCATION.—In NW. ¼ sec. 16, T. 2 S., R. 39 E., 3 miles southeast of Alicel, Union County, 1 mile above point where State ditch empties again into old channel of Grande Ronde River.

RECORDS AVAILABLE.—March 21 to May 22, 1918, when station was discontinued.

GAGE.—Chain gage on highway bridge; read by Enoch Johnson.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Excavated channel has been widened and deepened by flowing water, to solid gravel bottom; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 11.1 feet March 26 (discharge, 3,010 second-feet); no record of minimum discharge.

ICE.—None.

ACCURACY.—Stage-discharge relation shifting. Well-defined rating curve used March 21-28; indirect method for shifting control March 29 to April 3; poorly defined curve April 4-30; discharge for May not computed. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

COOPERATION.—Field data furnished by Grande Ronde drainage district.

State ditch is a channel excavated across a bend of Grande Ronde River and, at present, carries most of the flow of the river.

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Discharge measurements of State ditch near Alicel, Oreg., during the year ending Sept. 30, 1918.

[Made by Rhea Luper.][a]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Feb. 19	4.03	394	Mar. 27	10.56	2,720
Mar. 21	8.10	1,530	Apr. 5	8.36	1,170

[a] Engineer, Grande Ronde drainage district.

Daily discharge, in second-feet, of State ditch near Alicel, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	Day.	Mar.	Apr.	Day.	Mar.	Apr.
1		2,230	11		1,280	21	1,500	600
2		1,790	12		1,320	22	1,750	630
3		1,500	13		1,360	23	2,130	670
4		1,180	14		1,110	24	2,530	730
5		1,160	15		920	25	2,780	810
6		980	16		1,070	26	3,010	830
7		860	17		980	27	2,840	810
8		780	18		810	28	2,380	730
9		920	19		700	29	2,360	700
10		1,100	20		620	30	2,330	700
						31	2,380	.....

Monthly discharge of State ditch near Alicel, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March 21-31	3,010	1,500	2,360	51,500
April	2,230	600	996	59,300

PALOUSE RIVER NEAR POTLATCH, IDAHO.

LOCATION.—About sec. 3, T. 41 N., R. 5 W., a quarter of a mile above Kennedy Ford, three-quarters of a mile below Deep Creek, and 3½ miles below Potlatch, Latah County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 24, 1914, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by F. S. Vowell and C. D. Morris.

DISCHARGE MEASUREMENTS.—Made from bridge three-quarters of a mile below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders and solid rock; practically permanent. No well-defined control. At extremely high stages water flows around gage on right bank.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 10.80 feet at 10 p. m. March 26 (discharge, 2,780 second-feet); minimum stage recorded, 0.12 foot at 2 a. m. September 18 (discharge, 1.5 second-feet).

1914–1918: Maximum stage recorded, 13.98 feet at 9.15 a. m. March 21, 1916 (discharge, 5,090 second-feet); minimum stage recorded, 0.02 foot at 3 a. m. December, 1914 (discharge, about 1 second-foot).

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ICE.—Stage-discharge relation not affected by ice during year.

DIVERSIONS.—None.

REGULATION.—Flow affected by regulation of Potlatch Lumber Co.'s reservoir 5 miles above station.

ACCURACY.—Stage-discharge relation for medium stages changed March 26 during high water; no change for extreme low and high stages. Rating curves well defined. Operation of water-stage recorder unsatisfactory at times as noted in footnote to table of daily discharge. Daily discharge for the greater part of the year ascertained by use of discharge integrator; for the period of high water in December and January by averaging results obtained by applying to rating table the mean gage heights for period of few hours each, determined from recorder graph by inspection, and for extremely low water during June to September by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records good except for periods estimated, for which they are fair.

Discharge measurements of Palouse River near Potlatch, Idaho, during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 9	G. L. Parker	0.60	15.2	May 11	R. B. Kilgore	1.74	116
Feb. 11	T. R. Newell	4.85	784	11	do	1.54	90
18	do	3.34	430	June 27	L. D. Carson	.92	36.6
Mar. 24	do	8.23	1,700	27	do	.73	23.7

Daily discharge, in second-feet, of Palouse River near Potlatch, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	10	14	900	390	190	1,130	215	75	13	11	10
2	13	11	17	1,060		206	970	210	76	23	11	6.5
3	13	12	20	741	435	302	774	181	67	20	11	6.7
4	14	14	18	810	373	364	649	169	69	23	13	
5	9.5	6	22	1,240	532	334	598	170	64	15	6.7	
6	9.4	12	15	1,240	1,430	292	548	169	55	21	9.1	
7	15	8.5	25	1,250	2,070	261	420	168	38	17	9.5	
8	10	11	19	1,510	1,480	214	402	162	36	15	11	
9	7.7	12		1,140	926	230	538	156	40	17	8.7	
10	9.2	9.6		825	771	291	758	122	42	15	12	6.0
11	7.2	16		647	825	316	981	99	45	13		
12	8.6	4	60	500	887	425	736	95	39	22		
13	8.9	9.8		478	680	658	762	98	42	11		
14	9.3	11			663	530	705	95	44	17		
15	7.2	9.6			534	502	624	81	36	7.3		
16	9.1	10		450	473	550	478	70	39	9.8		
17	9.8	9.4	101		332	838	462	77	31	12		
18	9.6	9.8	320		383	1,430	432	165	33	9.8	9.5	4.1
19	8.2	10	642		375	1,590	383	176	31	7.7		4.5
20	9.1	8.7	640	416	257	1,310	325	114	33	10		5.1
21	11	9.4	370		207	1,050	323	116	28	9.1		2.9
22	8.2	8.4	211		219	1,140	420	114	29	11		8.4
23	7.1	9.6	269		317	1,510	411	116	32	8.0		4.1
24	20	11	357	530	272	1,690	406	112	28	10		4.8
25	4.8	11	194		206	1,800	386	93	27	10		5.6
26	6.1	9.1	242		186	2,460	321	76	27	14	8	4.5
27	8.3	9.2	854	673	210	2,520	283	75	29	9.8	10	7
28	13	9.6	1,260	607	209	1,850	284	80	22	9.5	7	4.8
39	7.1	13	1,940	594	.....	1,320	234	75	26	10	9.8	6.7
30	8.5	11	2,260	371	.....	1,140	217	79	32	10	6.2	11
31	13	.....	1,250	370	.....	1,160	.....	74	.....	11	9.5	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated from weather records.

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Monthly discharge of Palouse River near Potlatch, Idaho, for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	20	4.8	9.90	609
November	16	4.0	10.2	607
December	2,260	14	372	22,900
January	1,510	.....	686	42,200
February	2,070	186	573	31,800
March	2,520	190	918	56,400
April	1,130	217	532	31,700
May	215	70	123	7,560
June	76	22	40.5	2,410
July	23	7.3	13.3	818
August	13	6.2	9.55	587
September	11	2.9	6.02	358
The year	2,520	2.9	273	198,000

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MISCELLANEOUS MEASUREMENTS.

Discharge measurements of streams in the Snake River basin at points other than regular gaging stations, made during the year ending September 30, 1918, are listed in the following table:

Miscellaneous discharge measurements in Snake River drainage basin during the year ending Sept. 30, 1918.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Oct. 6	Spring Creek	Snake River	NW. ¼ sec. 9, T. 44 N., R. 114 W., at Wolff's ranch, 3¼ miles south of Elk post office, Wyo.		5.0
June 14	do	do	do		39.0
24	do	do	do		13.4
July 18	do	do	do		11.6
25	do	do	do		13.0
Aug. 11	do	do	do		10.0
26	do	do	do		8.7
Sept. 12	do	do	do		10.7
25	do	do	do		9.8
Oct. 6	do	do	NE. ¼ sec. 24, T. 44 N., R. 115 W., near mouth, 1½ miles southeast of Cunningham's ranch, and 8 miles southwest of Elk, Wyo.		2.6
June 24	do	do	do		12.9
July 17	do	do	do		17.4
25	do	do	do		9.0
Aug. 11	do	do	do		12.2
26	do	do	do		8.8
Sept. 13	do	do	do		10.4
26	do	do	do		6.0
June 14	Ditch Creek	do	Sec. 30, T. 43 N., R. 115 W., half a mile above mouth and 2 miles west of Grovont, Wyo.		341
23	do	do	do		104
July 17	do	do	do		3.0
25	do	do	do		1.1
Oct. 7	Reserve Creek	do	Sec. 3, T. 42 N., R. 116 W., half a mile above mouth and 2½ miles north of Teton post office, Wyo.		[a] 4.0
June 8	do	do	do		2.4
July 2	do	do	do		[a] .1
26	do	do	do		1.8
Aug. 12	do	do	do		2.7
29	do	do	do		2.4
Sept. 9	do	do	do		2.6
23	do	do	do		2.5
June 8	Stewart Creek	do	NW. ¼ sec. 3, T. 42 N., R. 116 W., half a mile above mouth and 2 miles north of Teton post office, Wyo.		36.8
July 2	do	do	do		18.4
26	do	do	do		6.8
Aug. 12	do	do	do		.2
June 15	Deland ditch	do	Sec. 10, T. 42 N., R. 116 W., half a mile above mouth and 5½ miles north of Zenith post office, Wyo.	2.01	37.6
23	do	do	do	1.40	19.9
July 10	do	do	do	1.14	11.7
27	do	do	do	1.53	21.3
Aug. 13	do	do	do	1.49	15.8
21	do	do	do	.85	4.7
28	do	do	do	1.24	5.7
Sept. 13	do	do	do	1.23	5.2

[a] Estimated.

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Miscellaneous discharge measurements in Snake River drainage basin during the year ending Sept. 30, 1918—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
June 15	Owl ditch	Snake River	NE. ¼ sec. 21, T. 42 N., R. 116 W., 4 miles north of Zenith post office, Wyo.		13.6
23	do	do	do		11.3
July 10	do	do	do		7.6
27	do	do	do		10.0
Aug. 13	do	do	do		5.3
28	do	do	do		1.5
Sept. 13	do	do	do		3.4
June 22	Spring Creek	do	SW. ¼ sec. 21, T. 42 N., R. 116 W., 3 miles north of Zenith post office, Wyo.		5.4
July 10	do	do	do		3.7
27	do	do	do		3.9
Aug. 13	do	do	do		3.5
28	do	do	do		1.8
July 6	Ely Creek	do	About sec. 24, T. 41 N., R. 116 W., 400 feet above mouth and 4 miles west of Jackson, Wyo.		15.1
Aug. 2	do	do	do		12.4
19	do	do	do		10.9
Sept. 3	do	do	do		10.5
16	do	do	do		9.8
29	do	do	do		5.7
July 6	Blue Crane Creek	do	Sec. 13, T. 40 N., R. 117 W., 2 miles west of Cheney post office, Wyo.	1.95	10.6
Aug. 2	do	do	do	1.87	5.9
19	do	do	do	1.94	9.3
Sept. 18	do	do	do	1.84	5.0
June 18	Game Creek	do	SE. ¼ sec. 26, T. 40 N., R. 116 W., 1 mile above mouth and 2 miles southeast of Cheney post office, Wyo.		7.2
July 7	do	do	do		4.6
Aug. 3	do	do	do	4.54	3.4
20	do	do	do		3.5
Sept. 5	do	do	do	4.49	2.3
19	do	do	do	4.45	1.9
July 20	Porcupine Creek	do	NW. ¼ NE. ¼ sec. 11, T. 39 N., R. 116 W., 5 miles southeast of Cheney post office, Wyo.	4.08	1.4
Aug. 31	do	do	do	3.91	.9
July 20	Martin Creek and Spring Canyon.	do	About sec. 26, T. 38 N., R. 116 W., 13 miles south of Cheney and 15 miles east of Alpine, Idaho.	1.99	5.3
Oct. 1	do	do	Near mouth, 21 miles south of Cheney, Wyo.		3.9
June 15	Table Creek	do	700 feet above mouth. Table Creek enters Snake River 13 miles above mouth of Snake River canyon near Alpine, Idaho.	.98	2.5
July 10	do	do	do	.85	.9
June 20	Pine Bar Creek	do	Near mouth of creek. Pine Bar Creek enters Snake River on left 14 miles below mouth of Hoback River.	1.97	16.6
July 19	do	do	do	1.74	4.1
27	do	do	do	1.72	3.0
Aug. 30	do	do	do	1.60	1.5
Sept. 9	do	do	do	1.62	1.5
July 10	Trail Creek	do	Near mouth of creek and 12 miles above mouth of Snake River canyon near Alpine, Idaho.	1.55	.9
10	Station Creek	do	Mouth of creek. Station Creek enters Snake River on right 11 miles above Snake River canyon near Alpine, Idaho.	1.90	.8

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Miscellaneous discharge measurements in Snake River drainage basin during the year ending Sept. 30, 1918—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
July 15	Red Creek	Snake River	Short distance above mouth. Red Creek enters Snake River on right 5 miles above mouth of Snake River canyon near Alpine, Idaho.	1.40	4.4
22	do	do	do	1.30	3.3
31	do	do	do	1.22	1.5
15	Cottonwood Creek	do	¼ mile above mouth. Cottonwood Creek enters Snake River on right 4 miles above mouth of Snake River canyon near Alpine, Idaho.	.75	[a] 3.0
22	do	do	do	1.60	3.6
31	do	do	do	1.47	1.0
June 6	Trout Creek	Salt River	Near mouth. Trout Creek enters Salt River about half a mile above its mouth.		25.6
July 2	do	do	do	1.88	7.1
11	do	do	do	1.88	7.4
25	do	do	do	1.79	4.9
Aug. 3	do	do	do	1.72	3.9
11	do	do	do	1.68	3.3
Sept. 6	do	do	do	1.60	2.3
June 26	Williams Creek	Snake River	3 miles west of Alpine, Idaho, on south side of Snake River.		2.8
July 11	do	do	do		1.8
23	do	do	do		1.6
June 4	Alpine Hot Springs	Indian Creek	Near mouth, 5 miles west of Alpine, Idaho.		8.0
Aug. 23	do	do	do		3.5
Sept. 7	do	do	do		3.0
21	do	do	do		2.3
July 25	Hansen Springs	Snake River	Near mouth of creek, 3 miles northwest of Blowout, Idaho.		4.2
Aug. 9	do	do	do		6.1
22	do	do	do		4.7
Sept. 7	do	do	do		3.4
21	do	do	do		2.6
June 26	Summitt Creek	do	About sec. 18, T. 2 S., R. 45 E., 1 mile below Blowout, Idaho.		2.8
6	Little Elk Creek	do	About sec. 23, T. 1 S., R. 46 E., a short distance above mouth and 5½ miles northwest of Blowout. Idaho.		6.3
July 8	Upper Spring Creek	Rainy Creek	Short distance above mouth, near Swan Valley, Idaho.		3.3
24	do	do	do		3.0
Aug. 8	do	do	do		2.7
21	do	do	do		2.9
Sept. 20	do	do	do		2.7
July 9	Lower Spring Creek	do	do		8.6
24	do	do	do		8.7
Aug. 8	do	do	do		10.2
21	do	do	do		10.2
Sept. 20	do	do	do		7.1
June 8	Pritchard Creek	Snake River	¾ mile west of Snake River ranger station and 5 miles west of Swan Valley, Idaho.	1.27	7.6
Aug. 11	do	do	do	.89	2.0
June 8	Granite Creek	do	Near mouth, 6 miles east of Antelope post office, Idaho.	1.10	2.2
24	do	do	do	1.04	1.7
11	Black Canyon Creek	do	½ mile above mouth and 8 miles below Swan Valley, Idaho.	1.68	23.0
July 7	do	do	do	1.28	6.2
23	do	do	do	1.18	4.1
Aug. 7	do	do	do	1.09	3.2
20	do	do	do	1.04	2.4
Sept. 4	do	do	do	1.00	1.5
18	do	do	do	.99	1.3

[a] Estimated.

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Miscellaneous discharge measurements in Snake River drainage basin during the year ending Sept. 30, 1918—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
July 7	Indian Rock Springs	Snake River	North side of Snake River, ¼ mile above Burns Creek and 16 miles above Heise, Idaho.		37.2
23	do	do	do		37.9
Aug. 7	do	do	do		40.0
Sept. 4	do	do	do		34.8
18	do	do	do		33.0
June 11	do	do	T. 3 N., R. 42 E., 500 yards above mouth and 11 miles southeast of Heise, Idaho.	3.50	111
July 7	do	do	do	2.62	23.9
23	do	do	do	2.52	18.8
Aug. 7	do	do	do	2.47	17.3
20	do	do	do	2.44	14.4
Sept. 4	do	do	do	2.43	13.4
18	do	do	do	2.48	11.3
June 10	Mud Creek	do	3 miles west of mouth of Burns Creek, 12 miles east of Heise, Idaho.		2.9
8	Antelope Creek	do	¼ mile below road and 2 miles west of Antelope post office, Idaho.	.99	2.0
Mar. 26	Smith Creek	South Fork of Boise River.	About sec 7, T. 2. N., R 7 E., at bridge a short distance above mouth, 4 miles west of Lenox, Elmore Co., Idaho.	3.02	196
27	Long Gulch Creek	do	Sec. 2, T. 2 N., R. 6 E., ¼ mile above mouth and 8 miles northwest of Lenox, Elmore County, Idaho.	1.60	32.9
Jan. 2	Grande Ronde River	Snake River	Hilgard, Oreg		1,260
Feb. 10	do	do	Near Imbler, Oreg	3.40	788
Mar. 27	do	do	do	9.02	3,540
Apr. 6	do	do	do		1,840
Feb. 18	do	do	NW. ¼ sec. 13, T. 1 S., P. 39 E., 4 miles south of Elgin, Oreg.	7.7	1,130
Apr. 5	do	do	do	10.36	2,390
Mar. 28	Indian Creek	Grande Ronde River	Near mouth, Elgin, Oreg		124
28	Clarks Creek	do	do		111
28	Phillips Creek	do	do		172

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ALBERT B. FALL, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 484

SURFACE WATER SUPPLY OF THE UNITED STATES

1918

PART XII. NORTH PACIFIC SLOPE DRAINAGE BASINS

C. LOWER COLUMBIA RIVER BASIN AND PACIFIC SLOPE DRAINAGE BASINS IN OREGON

NATHAN C. GROVER, Chief Hydraulic Engineer
F. F. HENSHAW and G. L. PARKER, District Engineers

Prepared in cooperation with the States of
OREGON AND WASHINGTON

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1922

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SURFACE WATER SUPPLY OF LOWER COLUMBIA RIVER AND PACIFIC SLOPE DRAINAGE BASINS IN OREGON, 1918.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting records of measurements of flow made on streams in the United States during the year ending September 30, 1918.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

> *Provided*, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies relating to irrigation in the arid West. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ending June 30, 1895–1919.

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1917, inclusive	150,000
1918	175,000

In the execution of the work many private and State organizations have cooperated either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 5.

Measurements of stream flow have been made at about 4,510 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1918, 1,180 gaging stations were being maintained by the Survey and the cooperating organizations.

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Many miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time. Information in regard to publications relating to water resources is presented in the appendix to this report.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miners' inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, acre-feet, and millions of cubic feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross-section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in inches.

An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

"Stage-discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," a term used to designate the section or sections of the stream channel below the gage which determine the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

The "point of zero flow" for a gaging station is that point on the gage—the gage height—to which the surface of the river would fall if there were no flow.

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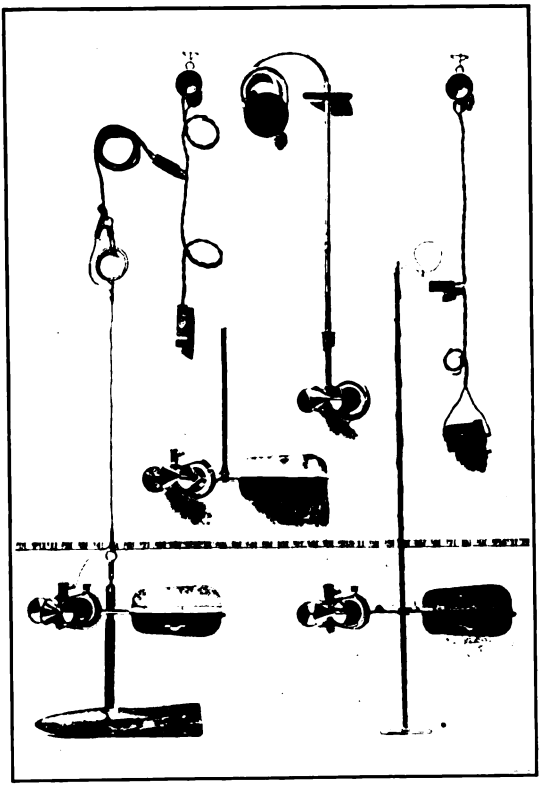

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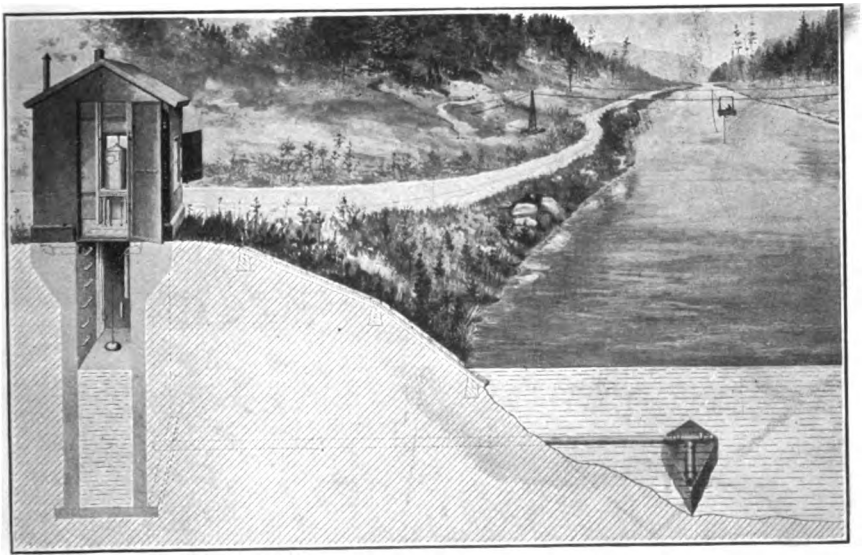

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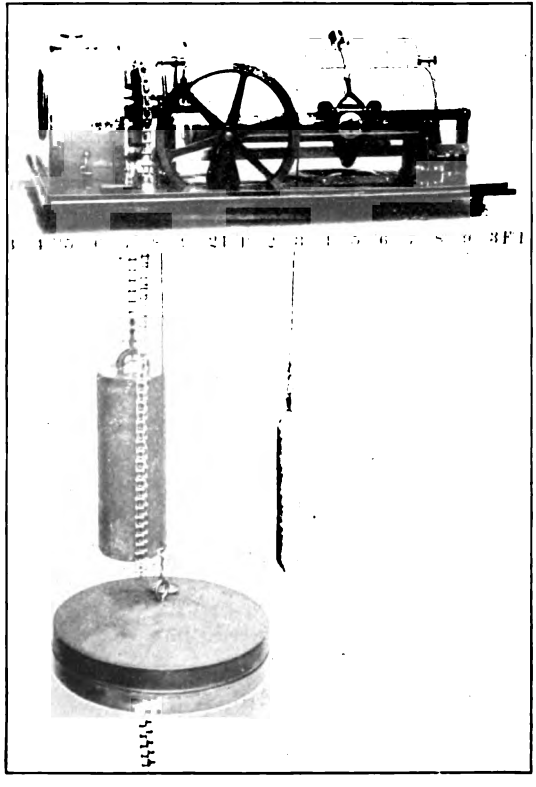

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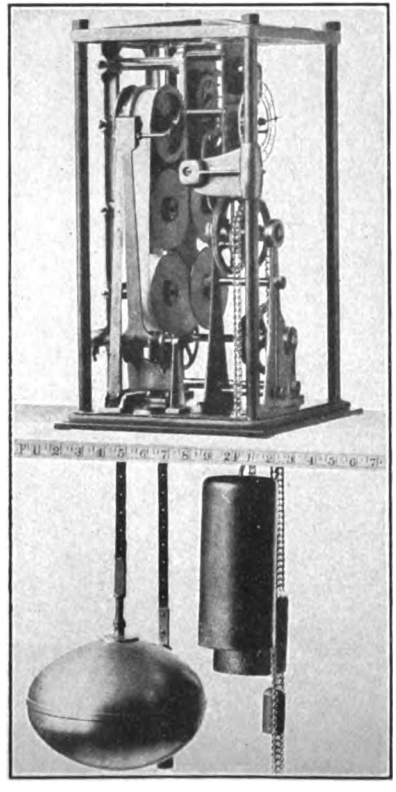

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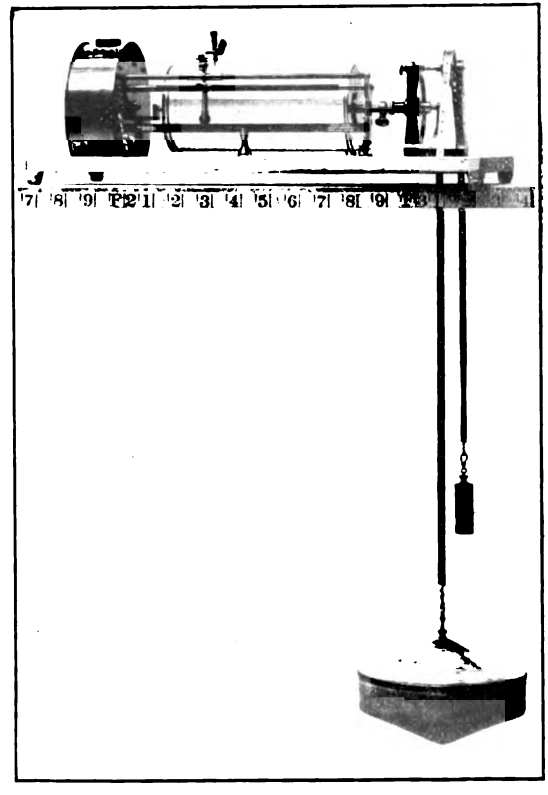

C. FRIEZ.

WATER-STAGE RECORDERS.

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EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1917, and ending September 30, 1918. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter. (See Pls. I, II.) The general methods are outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to the gage heights, give the discharge from which the daily, monthly, and yearly means of discharge are determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving records of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage height and records of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanence of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of backwater. It gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the

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mean daily discharge may be obtained by averaging discharge at regular intervals during the day or by use of the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet per second during the month. On this average flow are based computations recorded in the remaining columns, which are defined on page 2.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of stream-flow data depends primarily (1) on the permanence of the stage-discharge relation, and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of records.

A paragraph in the description of the station gives information regarding the (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage height to the rating table to obtain the daily discharge.

For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large non-contributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "Run-off in inches" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off in inches" previously published by the Survey

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should be used with caution because of possible inherent sources of error not known to the Survey.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

The work in Oregon and Washington was carried on under cooperative agreements between the United States Geological Survey and the respective States.

Cooperation with the States is effected under contracts which are made between the Director of the United States Geological Survey and the State engineers or other officials and are authorized by legislative acts appropriating moneys.

Acknowledgments are due to John H. Lewis, State engineer of Oregon, and to Henry Landes, State geologist of Washington, for the efficient manner in which they represented their States in the cooperative investigations.

Acknowledgments are also due to the United States Reclamation Service, the United States Forest Service, the United States Office of Indian Affairs, and the State Water Board of Oregon for assistance, suggestions, and the freest use of data gathered exclusively for them and paid for by them; to the Corps of Engineers, United States Army; and to the United States Weather Bureau for hydrographic and climatic data.

Special acknowledgments are due for financial assistance rendered by municipalities, corporations, and individuals, as follows: Water masters for Umatilla, Crook, and Deschutes counties, water bureau of the city of Portland, Tumalo project of the State of Oregon, Ochoco Irrigation District, Suttle Lake Irrigation District, East Fork Irrigation District, Talent Irrigation District, Medford Irrigation District, Horse Heaven Irrigation District, Pacific Power & Light Co., Central Oregon Irrigation Co., Arnold Irrigation Co., Northwestern Electric Co., Portland Railway, Light & Power Co., Waldo Lake Irrigation & Power Co., North Coast Power Co., California-Oregon Power Co., Rogue River Valley Canal Co., M. A. Moody, and J. G. Kelley.

DIVISION OF WORK.

The data for stations in Oregon and Washington, except those in the Cowlitz River basin in Washington, were collected and prepared for publication under the direction of F. F. Henshaw, district engineer, assisted by C. L. Batchelder and R. C. Briggs.

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Data for stations in the Cowlitz River basin in Washington were collected and prepared for publication under the direction of G. L. Parker, district engineer, assisted by Lasley Lee, T. G. Bedford, L. D. Carson, W. E. Dickinson, and E. C. Howard.

The records were reviewed and the manuscript assembled by B. L. Bigwood and Robert Follansbee.

GAGING-STATION RECORDS.

COLUMBIA RIVER AT THE DALLES, OREG.

LOCATION.—In sec. 34, T. 2 N., R. 13 E., 2,000 feet below ferry at The Dalles, Wasco County, 18 miles below Deschutes River, and above Hood and Klickitat rivers.

DRAINAGE AREA.—237,000 square miles.

RECORDS AVAILABLE.—June 1, 1878, to September 30, 1918. Maximum stages 1858 to 1877.

GAGE.—Two gages at The Dalles: The Government or Brooks gage, used by the United States Geological Survey, made up of several sections attached to the piling of viaduct connecting Regulator Dock with the warehouse; the United States Army engineers' gage, similar in form but with a datum of 8.9 feet lower than the Brooks gage. Gage at Cascade Locks, about 20 miles below The Dalles, which was used in computing early records, has been situated at various points but is at present attached to side of wooden fender of upper locks chamber between upper guard and lock gates. Elevation of datum of Brooks gage, 46.36 feet (adjustment of primary level net, 1912).

DISCHARGE MEASUREMENTS.—In 1903, made by United States Army engineers with rod floats and meter from a steamer; in 1907, by United States Geological Survey engineers with meter from a launch; in 1908, float measurements by United States Geological Survey engineers 2,000 feet below gage at The Dalles; in 1910 and 1913, measurements by United States Geological Survey engineers on Columbia River above Snake River and on Snake River referred to The Dalles gage, allowance being made for intervening tributaries.

CHANNEL AND CONTROL.—Rocky and permanent at the rapids at Cascade Locks, the control for all three gages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 33.7 feet, June 25 (discharge, 578,000 second-feet); minimum stage recorded, 1.0 foot November 27 (discharge, 70,600 second-feet).

1858–1918: Maximum stage recorded, 59.6 feet June 6, 1894 (discharge, 1,170,000 second-feet); minimum stage recorded, —3.9 feet on gage at Cascade Locks January 7, 1890 (discharge, 41,900 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Quantity of water diverted for irrigation is large in the aggregate but constitutes only a small proportion of the total flow; the low-water flow, which comes in the winter, is little affected.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during winter; open water rating applicable throughout year. Rating curve well defined between 80,000 and 900,000 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

COOPERATION.—Gage readings furnished by United States Weather Bureau.

No discharge measurements made during year.

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Daily discharge, in second-feet, of Columbia River at The Dalles, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1...	107,000	85,600	79,400	313,000	146,000	104,000	195,000	246,000	311,000	518,000	237,000	140,000
2...	106,000	83,800	79,400	303,000	138,000	104,000	195,000	255,000	311,000	507,000	230,000	138,000
3...	106,000	82,900	78,600	283,000	129,000	103,000	195,000	270,000	327,000	487,000	220,000	137,000
4...	106,000	82,900	82,000	279,000	122,000	101,000	191,000	286,000	327,000	467,000	216,000	136,000
5...	104,600	82,900	86,500	263,000	134,000	102,000	185,000	299,000	322,000	451,000	212,000	135,000
6...	101,000	82,900	89,200	252,000	136,000	103,000	178,000	332,000	322,000	432,000	209,000	135,000
7...	99,000	82,000	87,400	252,000	147,000	105,000	173,000	363,000	335,000	411,000	208,000	134,000
8...	96,000	82,000	85,600	246,000	155,000	105,000	166,000	372,000	358,000	385,000	206,000	132,000
9...	96,000	82,000	83,800	246,000	159,000	103,000	165,000	363,000	381,000	370,000	205,000	130,000
10...	98,000	81,100	82,000	246,000	159,000	101,000	166,000	363,000	405,000	352,000	202,000	125,000
11...	101,000	80,200	81,100	236,000	156,000	99,000	172,000	359,000	430,000	340,000	198,000	121,000
12...	105,000	79,400	80,200	226,000	146,000	100,000	204,000	356,000	457,000	328,000	190,000	121,000
13...	105,000	79,400	84,700	216,000	142,000	101,000	215,000	352,000	481,000	320,000	185,000	121,000
14...	107,000	78,600	88,300	219,000	142,000	102,000	222,000	349,000	501,000	311,000	184,000	117,000
15...	108,000	77,000	85,600	216,000	140,000	103,000	226,000	358,000	530,000	311,000	181,000	116,000
16...	108,000	75,400	95,000	209,000	137,000	105,000	229,000	372,000	560,000	311,000	181,000	115,000
17...	108,000	73,000	107,000	204,000	135,000	106,000	223,000	388,000	566,000	310,000	173,000	114,000
18...	107,000	71,400	122,000	205,000	131,000	106,000	219,000	395,000	566,000	308,000	168,000	114,000
19...	105,000	72,200	138,000	199,000	125,000	110,000	209,000	401,000	564,000	302,000	165,000	114,000
20...	103,000	73,000	138,000	195,000	122,000	116,000	205,000	390,000	564,000	292,000	164,000	114,000
21...	101,000	73,800	177,000	187,000	118,000	128,000	204,000	385,000	570,000	287,000	163,000	114,000
22...	100,000	72,200	211,000	180,000	114,000	137,000	204,000	376,000	574,000	286,000	161,000	113,000
23...	99,000	71,400	173,000	172,000	112,000	144,000	208,000	365,000	572,000	284,000	161,000	113,000
24...	100,000	71,400	157,000	166,000	110,000	154,000	218,000	359,000	572,000	283,000	160,000	113,000
25...	99,000	71,400	166,000	163,000	108,000	160,000	234,000	349,000	578,000	283,000	159,000	112,000
26...	98,000	71,400	165,000	161,000	110,000	168,000	243,000	342,000	574,000	278,000	157,000	108,000
27...	97,000	70,600	164,000	172,000	108,000	176,000	248,000	339,000	572,000	273,000	155,000	108,000
28...	94,000	72,200	174,000	185,000	105,000	187,000	246,000	332,000	564,000	267,000	152,000	108,000
29...	91,000	74,600	211,000	174,000	.....	195,000	245,000	325,000	549,000	263,000	150,000	110,000
30...	88,300	79,400	255,000	163,000	.....	197,000	245,000	320,000	530,000	255,000	146,000	110,000
31...	87,400	.....	302,000	155,000	.....	197,000	.....	313,000	.....	246,000	141,000	.....

Monthly discharge of Columbia River at The Dalles, Oreg., for the year ending Sept. 30, 1918.

[Drainage area, 237,000 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	108,000	87,400	101,000	0.426	0.49	6,210,000
November	85,600	70,600	77,200	.326	.36	4,590,000
December	302,000	78,600	129,000	.544	.63	7,930,000
January	313,000	155,000	216,000	.911	1.05	13,300,000
February	159,000	105,000	132,000	.557	.58	7,330,000
March	197,000	99,000	127,000	.536	.62	7,810,000
April	248,000	165,000	208,000	.878	.98	12,400,000
May	401,000	246,000	344,000	1.45	1.67	21,200,000
June	578,000	311,000	476,000	2.01	2.24	28,300,000
July	518,000	246,000	339,000	1.43	1.65	20,800,000
August	237,000	141,000	182,000	.768	.88	11,200,000
September	140,000	108,000	121,000	.511	.57	7,200,000
The year	578,000	70,600	205,000	.865	11.72	148,000,000

TRIBUTARIES OF COLUMBIA RIVER BELOW MOUTH OF SNAKE RIVER.

WALLA WALLA RIVER BASIN.

WALLA WALLA RIVER NEAR MILTON, OREG.

LOCATION.—In sec. 21, T. 5 N., R. 36 E., half a mile below junction of North and South forks of Walla Walla River, and 4 miles above Milton, Umatilla County.

DRAINAGE AREA.—Not measured.

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RECORDS AVAILABLE.—March 17 to September 30, 1918.

GAGE.—Friez water-stage recorder referred to vertical staff; inspected by W. W. Roeder. Temporary staff used to May 25.

DISCHARGE MEASUREMENTS.—Made from cable 9 feet below gage.

CHANNEL AND CONTROL.—Left bank overflowed at high stages; right bank high and rocky. Control, 100 feet below gage, is composed of gravel and small boulders; may shift slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 1.74 feet at 6 a.m. March 26 (discharge, estimated from extension of rating curve, 606 second-feet); mininum stage recorded, 0.17 foot at 3 p. m. July 18 (discharge, 95 second-feet.)

REGULATION.—Release of ponded water at the Pacific Power and Light Co.'s plant about 5 miles above station affects the flow somewhat, especially at low water.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined from 100 to 500 second-feet. Operation of water-stage recorder satisfactory from April to September. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting recorder graph. Records good.

COOPERATION.—Station installed and records obtained under direction of A. E. Perry, water master for Umatilla County.

Discharge measurements of Walla Walla River near Milton, Oreg., during the year ending ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 25	Perry and Batchelder...	1.32	448	July 11	Perry and Roeder.....	0.28	128
June 20	Perry and Roeder [a]....	.38	151	Aug. 31	....do.....	.25	112

[a] Water masters.

Daily discharge, in second-feet, of Walla Walla River near Milton, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	515	410	245	128	120	112
2	.....	445	410	230	130	125	115
3	.....	410	428	290	130	125	112
4	.....	392	480	215	145	122	110
5	.....	375	480	215	145	122	108
6	.....	358	428	212	140	122	112
7	.....	358	410	215	125	120	120
8	.....	375	392	290	125	120	120
9	.....	445	375	215	118	125	120
10	.....	480	340	215	125	120	125
11	.....	480	322	203	122	120	145
12	.....	480	322	200	122	122	135
13	.....	445	322	200	118	125	132
14	.....	410	322	191	120	122	142
15	.....	410	322	185	125	130	138
16	.....	375	392	179	125	130	135
17	410	358	358	179	105	130	130
18	392	340	340	176	105	128	128
19	410	322	322	161		128	125
20	410	322	305	155		122	125
21	392	392	290	155		118	132
22	428	428	305	152	130	112	138
23	445	445	290	155		115	135
24	480	445	290	150		105	122
25	550	445	290	148		105	120
26	590	410	275	142	152	112	128
27	550	410	260	140	152	120	128
28	480	392	260	135	145	118	130
29	480	392	245	130	138	112	135
30	515	392	245	130	135	115	130
31	550	.....	245	.....	128	112	.....

NOTE.—Discharge estimated July 19-25.

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Monthly discharge of Walla Walla River near Milton, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.	Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.			Maximum.	Minimum.	Mean.	
March 17-30	590	392	472	14,000	August	130	105	121	7,440
April	515	322	408	24,300	September	145	108	128	7,620
May	480	245	338	20,800					
June	245	130	183	10,900	The period				93,000
July			129	7,930					

UMATILLA RIVER BASIN.

UMATILLA RIVER ABOVE FURNISH RESERVOIR, NEAR YOAKUM, OREG.

LOCATION.—In NW. ¼ sec. 17, T. 2 N., R. 31 E., at Oregon-Washington Railroad & Navigation Co.'s bridge a quarter of a mile above Campbell flag station, 5 miles by river above Yoakum and old gaging station, and 10 miles west of Pendleton, Umatilla County; just above backwater from Furnish reservoir.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 18 to August 28, 1915; July 5, 1916, to September 30, 1918.

GAGE.—Stevens eight-day water-stage recorder on right side of main channel at downstream end of bridge pier, installed July, 1916; read by J. M. Bilton and A. E. Perry. Temporary gage near same location used in 1915.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet above gage, by wading, or from a log across river 200 feet above cable.

CHANNEL AND CONTROL.—Channel straight at bridge; current even; overflow channel extends under west span of bridge. Left bank high and rocky; right bank low with some cottonwood and brush. Control is at almost right-angle turn to right, about 250 feet below gage and below deep pool; composed of gravel; may shift slightly.

EXTREMES OF DISCHARGE.—Maximum stage during year, estimated from recorder graph, 9.0 feet, at 11 a. m. December 29 (discharge, 7,550 second-feet); minimum stage recorded, 0.32 foot at 9.30 a. m. August 29 (discharge, 30 second-feet).

1916–1918: Maximum stage recorded, 9.03 feet May 13, 1917 (discharge, 7,940 second-feet); minimum stage recorded, 0.40 foot July 27, 1917 (discharge, 27 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—720 acres irrigated from Umatilla River above station and some from tributaries.

REGULATION.—At low stages water is ponded in the power canals of two flouring mills at Pendleton and released at intervals to obtain sufficient power for operating the mills. This causes a rapidly fluctuating stage at the station. There will be practically no effect at medium and high stages. Backwater from Furnish reservoir extends to within a few hundred yards of control.

ACCURACY.—Stage-discharge relation changed during winter. Rating curves used as follows: October 1 to December 14, well defined below 500 second-feet; December 15 to September 30, well defined below 3,500 second-feet. Operation of water-stage recorder satisfactory except October 18 to November 8 and May 18 to June 10. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, except for periods when water-stage recorder was not operating, for which it was ascertained by estimation and interpolation. Records excellent.

COOPERATION.—Records obtained under direction of A. E. Perry, water master for Umatilla County.

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Discharge measurements of Umatilla River above Furnish reservoir, near Yoakum, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 24	C. L. Batchelder	5.58	2,820	June 17	Perry and Pearson	1.13	114
Apr. 20	A. E. Perry [a]	3.21	836	30	A. E. Perry	.85	75
May 17	do	2.37	468	July 12	do	.48	42.4
27	do	1.91	280	27	do	.60	47.0
June 3	do	1.54	207	Aug. 9	do	.46	37.6

[a] Water master for Umatilla County.

Daily discharge, in second-feet, of Umatilla River above Furnish reservoir, near Yoakum, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	43		109	2,630	[a] 1,760	780	2,860	780	[a] 226	72	[a] 37	33
2	42		115	2,300	[a] 1,550	830	2,100	755	[a] 222	[a] 67	[a] 36	34
3	41		92	1,910	1,380	970	1,650	730	208	[a] 63	36	33
4	40		87	1,910	1,330	1,260	1,410	730	[a] 201	[a] 58	35	33
5	41	55	82	2,100	1,650	1,190	1,160	730	[a] 194	[a] 54	36	35
6	41		82	2,100	2,000	1,060	1,060	680	[a] 186	49	34	34
7	42		93	2,520	2,630	970	1,000	630	[a] 179	48	33	36
8	40		107	3,970	2,200	910	1,000	590	[a] 172	45	34	36
9	39	54	101	3,340	1,820	880	1,260	550	[a] 164	42	36	37
10	38	58	103	2,520	1,570	880	1,910	510	[a] 157	42	39	40
11	38	60	101	2,000	1,490	855	2,000	475	150	40	36	39
12	38	58	105	4,100	1,410	880	1,910	475	146	40	36	36
13	40	59	123	4,100	1,330	1,030	1,730	458	140	39	34	37
14	41	58	1,030	3,100	1,300	1,060	1,490	458	136	38	33	40
15	40	60	910	2,630	1,130	1,030	1,260	422	130	38	33	43
16	40	59	630	2,630	1,090	1,060	1,090	405	122	38	35	42
17	40	55	510	2,520	1,030	1,260	1,000	458	116	40	37	42
18	[a] 41	59	1,090	3,220	1,000	1,910	880	[a] 440	108	40	36	39
19	[a] 42	57	1,490	2,860	910	2,200	830	[a] 423	104	40	40	36
20	[a] 44	58	2,000	2,860	830	2,000	830	[a] 405	98	36	54	34
21	[a] 45	60	1,570	2,300	780	1,820	880	[a] 388	94	40	59	35
22	46	58	1,120	1,910	730	1,820	1,000	370	89	37	48	37
23		59	1,570	1,730	705	2,200	1,090	[a] 357	82	37	44	39
24		60	2,300	1,650	705	2,520	1,090	[a] 344	77	62	42	40
25		63	1,570	4,100	680	3,220	1,060	[a] 331	95	66	39	41
26	48	57	1,260	5,050	780	3,580	970	[a] 318	100	55	38	40
27		58	2,860	3,840	805	3,340	855	305	92	50	36	40
28		56	5,050	2,980	755	2,630	805	[a] 291	87	47	35	40
29		60	6,950	2,520	.....	2,300	805	[a] 277	81	44	36	40
30		75	4,490	2,200	.....	2,300	805	[a] 264	76	39	36	40
31		.....	3,100	[a] 1,980	.....	2,630	.....	[a] 250	.....	37	36	.....

[a] Interpolated.

NOTE.—Discharge estimated October 23 to November 8.

Monthly discharge of Umatilla River above Furnish reservoir, near Yoakum, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.	Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.			Maximum.	Minimum.	Mean.	
October	.....	38	43.0	2,640	May	780	250	471	29,000
November	75	.....	58.0	3,450	June	236	76	135	8,030
December	6,950	82	1,320	81,200	July	72	36	46.5	2,860
January	5,050	1,650	2,760	170,000	August	59	33	38.0	2,340
February	2,630	680	1,260	70,000	September	43	33	37.7	2,240
March	3,580	780	1,660	102,000					
April	2,860	805	1,260	75,000	The year.	6,950	33	757	549,000

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UMATILLA RIVER NEAR UMATILLA, OREG.

LOCATION.—In NW. ¼ sec. 21, T. 5 N., R. 28 E., near main line of Oregon-Washington Railroad & Navigation Co., 1½ miles below diversion dam of main canal of West Division Umatilla project, and 1½ miles above Umatilla, Umatilla County, and mouth of river.

DRAINAGE AREA.—2,130 square miles.

RECORDS AVAILABLE.—October 21, 1903, to September 30, 1918.

GAGE.—Inclined staff in two sections; lower section 1.2 to 3.5 feet, upper 3.5 to 10.8 feet. Record from a gage above diversion dam of West Division project used January 15 to March 31, 1918. Read by T. J. George.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Solid rock overlain with gravel or sand. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year occurred December 29; exact gage height not known, but an approximate height of 2.4 feet (West Division project gage) was determined from flood mark at dam above station (discharge, about 7,000 second-feet); minimum stage recorded, 2.20 feet September 3 and 4 (discharge, 23 second-feet).

1903–1918: Maximum stage recorded, 11.0 feet May 31, 1906 (discharge, 19,600 second-feet); minimum stage recorded, 1.0 foot July 25 and August 1 to 9, 1906 (channel dry).

ICE.—Occasional shore and floating ice, but stage-discharge relation not materially affected.

DIVERSIONS.—Large part of total flow of river is diverted for irrigation above station. The Umatilla project feed canal also diverts water during winter for storage in Cold Springs reservoir. The main canal of the West Division Umatilla project of the United States Reclamation Service diverts just above the station. The low-water flow is return water from the Hermiston project and other irrigated tracts.

REGULATION.—Discharge is occasionally affected by pondage at the West Division project dam.

ACCURACY.—Stage-discharge relation practically permanent for stages above 3.5 feet (discharge, 770 second-feet); below this a change in relation occurred in 1917. A rating curve has been developed for each of the gages at this station. See under "Gage." The curve for the gage below diversion dam is well defined and for the gage above diversion dam is fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table, except for November, December, and January, for which it was ascertained by comparison with flow at the station above Furnish reservoir. Records good.

COOPERATION.—Gage-height record furnished by United States Reclamation Service.

Discharge measurements of Umatilla River near Umatilla, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 26	F. F. Henshaw	2.65	119	July 15	A. E. Perry	2.32	40.4
Mar. 23	C. L. Batchelder	[a] 4.25	1,800	Aug. 19	do	2.38	47.5

[a] Gage at West Division project dam read 0.94 foot.

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Daily discharge, in second-feet, of Umatilla River near Umatilla, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	75	95			1,120	740	2,620	580	68	68	53	37
2	75	92			1,070	740	2,450	589	68	71	53	37
3	73	95	125		1,020	740	1,970	490	68	75	57	22
4	73	92		2,100	975	906	1,520	410	75	81	53	28
5	73	95			975	975	1,180	330	75	89	57	24
6	75	95	110		1,380	820	995	295	75	64	53	26
7	75	97		1,520	2,080	780	880	260	78	64	53	34
8	75				2,080	780	825	218	81	62	51	36
9	75				1,560	740	825	165	73	62	51	37
10	75	111	120		1,220	740	1,380	118	71	57	51	34
11	89			3,000	1,120	740	1,740	89	66	53	51	31
12	97				1,030	700	1,590	64	64	53	50	30
13	103				1,030	780	1,590	62	62	47	50	30
14	103	125			975	820	1,380	75	66	43	50	34
15	103			2,850	906	820	1,240	64	64	43	50	40
16	103		500	2,560	820	820	995	64	60	45	50	47
17	95			2,400	820	820	938	47	57	53	50	47
18	92	129	450	3,060	820	1,270	720	71	62	53	50	47
19	92			3,060	780	2,080	535	103	64	66	50	47
20	92			2,240	700	1,930	370	92	60	45	50	50
21	92			1,810	735	1,690	490	81	57	40	62	50
22	92	133	1,300	1,430	626	1,550	490	71	57	47	68	50
23	95			1,220	592	1,740	580	75	55	50	48	47
24	95	128		1,170	626	2,240	720	86	55	53	48	47
25	89			2,080	660	2,560	720	86	58	53	47	47
26	75	122		5,060	698	3,100	625	86	53	53	45	43
27	75	[a] 122	1,380	3,060	592	3,060	490	103	53	40	43	40
28	92	[a] 122	4,000	2,400	558	2,560	450	89	53	40	43	40
29	103	122	[a] 6,500	1,930	.....	2,080	580	86	62	40	37	40
30	103	[a] 125	[a] 5,000	1,690	.....	2,080	625	75	64	43	37	40
31	103	.....	[a] 3,310	1,320	.....	2,400	.....	68	.....	43	37	.....

[a] Estimated.

NOTE.—Braced figures show estimated mean discharge for periods indicated.

Monthly discharge of Umatilla River near Umatilla, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.		
	Maximum.	Minimum.	Mean.	River.	Canals.	Total.
October	103	73	88.0	5,410	2,620	8,030
November	.....	92	116	6,900	900	7,800
December	[a] 6,500	.....	1,110	68,200	.....	68,200
January	5,060	1,170	2,400	148,000	.....	148,000
February	2,080	558	984	54,600	.....	54,600
March	3,100	700	1,410	86,700	.....	86,700
April	2,620	370	1,050	62,500	2,420	64,900
May	580	47	164	10,100	2,700	12,800
June	81	53	64.0	3,810	3,310	7,120
July	89	40	54.7	3,360	3,720	7,080
August	68	37	49.9	3,070	3,850	6,920
September	50	23	38.6	2,300	3,750	6,050
The year	[a] 6,500	23	628	455,000	23,300	478,000

[a] Estimated.

NOTE.—Run-off given for canals is sum of run-off of main canal of West Division and Oregon Land & Water Co.'s canal, which divert around the station. Run-off records of canals furnished by the United States Reclamation Service.

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JOHN DAY RIVER BASIN.

JOHN DAY RIVER AT McDONALD, OREG.

LOCATION.—In NW. ¼ sec. 11, T. 1 N., R. 19 E., at ferry at McDonald post office, Sherman County, half a mile below mouth of Rock Creek, 16 miles above junction with Columbia River, and 18 miles southwest of Arlington.

DRAINAGE AREA.—7,800 square miles.

RECORDS AVAILABLE.—December 16, 1904, to September 30, 1918.

GAGE.—Inclined staff in two sections on left bank, 183 feet above ferry cable; read by William G. McDonald.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Clean gravel and sand; shifts slightly. Banks high. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.8 feet at 6 a. m. February 8 (discharge, 11,200 second-feet); minimum stage recorded, 1.28 feet September 9 and 10 (discharge, 113 second-feet).

1905–1918: Maximum stage recorded, 10.38 feet February 6, 1907 (discharge, 22,800 second-feet). A flood about 25 years ago is said to have reached a height of 12.8 feet (discharge, estimated from extension of rating curve, 33,000 second-feet). Minimum stage recorded, 1.02 feet September 8 to 11, 1915 (discharge, 63 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Large part of natural low-water flow of stream is diverted for irrigation in the upper John Day Valley.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined between 250 and 10,000 second-feet and fairly well defined outside these limits. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of John Day River at McDonald, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	C. L. Batchelder	1.63	282	May 26	C. L. Batchelder	3.02	1,620
Jan. 15	do	4.59	4,560	Sept. 3	R. C. Briggs	1.33	130
Feb. 4	R. C. Briggs	3.71	2,640				

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Daily discharge, in second-feet, of John Day River at McDonald, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	386	318	1,100	3,640	2,630	1,990	7,360	4,100	1,320	598	240	152
2	365	330	1,100	2,810	1,990	1,840	7,360	4,100	1,260	539	222	144
3	344	330	1,100	2,460	2,300	2,140	6,760	4,100	1,260	460	200	128
4	330	344	1,260	2,300	2,630	2,300	5,900	4,100	1,320	400	185	128
5	330	365	955	2,300	2,630	2,460	5,100	4,580	1,320	400	170	124
6	300	386	820	2,810	3,200	2,460	4,580	4,840	1,380	400	160	120
7	300	386	730	2,630	6,180	2,140	4,100	4,580	1,440	385	180	120
8	300	365	685	2,460	9,880	1,990	3,860	4,100	1,570	365	152	120
9	300	344	640	3,420	6,180	1,990	3,640	3,860	1,700	330	144	113
10	300	400	640	2,140	4,580	2,140	3,640	3,640	1,840	330	140	113
11	300	408	640	1,990	4,340	2,140	6,180	3,200	1,770	308	140	120
12	300	430	598	1,990	4,100	2,140	6,180	2,810	1,770	270	140	120
13	300	408	598	2,630	4,100	2,140	6,180	2,630	1,840	300	152	120
14	294	400	555	6,460	3,860	2,300	5,620	2,460	1,700	270	152	222
15	282	365	555	4,840	3,640	2,300	5,360	2,630	1,840	258	156	200
16	282	386	598	4,100	3,200	2,140	5,100	2,810	1,640	222	160	140
17	270	400	1,000	4,100	2,630	2,300	4,840	2,630	1,440	210	152	216
18	270	400	1,000	4,580	3,000	2,810	4,340	2,460	1,320	210	124	185
19	270	400	910	6,460	2,810	3,860	4,100	2,300	1,210	210	140	165
20	270	400	820	6,180	2,630	5,360	3,640	2,140	1,000	200	160	210
21	270	400	955	4,580	2,140	5,100	3,640	2,140	955	210	160	234
22	270	400	1,260	3,640	1,920	5,100	3,640	1,990	910	205	160	210
23	300	400	1,380	3,200	1,770	6,180	4,100	1,840	910	185	160	210
24	300	400	1,320	3,000	1,840	6,460	4,580	1,840	910	170	270	318
25	300	386	1,840	3,000	2,300	7,360	4,840	1,700	1,380	160	240	210
26	300	386	2,300	3,640	2,140	8,600	4,840	1,570	1,100	185	240	185
27	300	386	2,460	6,180	1,990	9,240	4,840	1,570	1,000	200	222	190
28	300	430	3,640	5,100	2,140	7,960	4,340	1,500	910	258	205	205
29	300	438	3,860	4,100	.....	7,360	3,860	1,440	775	246	185	210
30	300	515	5,100	3,640	.....	7,060	3,860	1,380	640	240	165	210
31	318	.....	4,100	3,420	.....	6,760	.....	1,320	.....	240	160	.....

Monthly discharge of John Day River at McDonald, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.	Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.			Maximum.	Minimum.	Mean.	
October	386	270	302	18,600	May	4,840	1,320	2,790	172,000
November	515	318	390	23,200	June	1,840	640	1,310	78,000
December	5,100	555	1,410	88,500	July	598	160	289	17,800
January	6,460	1,990	3,670	226,000	August	270	124	175	10,800
February	9,880	1,770	3,310	184,000	September	318	113	171	10,200
March	9,240	1,840	4,070	250,000					
April	7,360	3,640	4,880	290,000	The year.	9,880	113	1,890	1,370,000

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DESCHUTES RIVER BASIN.

DESCHUTES RIVER BELOW BEND, OREG.

LOCATION.—In SE. ¼ sec. 20, T. 17 S., R. 12 E., half a mile below North canal dam and 2 miles north of Bend, Deschutes County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 27, 1914, to September 30, 1918.

GAGE.—Stevens water-stage recorder on right bank; inspected by W. L. Beebe.

DISCHARGE MEASUREMENTS.—Made from cable about 50 feet upstream from gage.

CHANNEL AND CONTROL.—Coarse gravel and boulders. Logs, drift, and aquatic plants on the wide shallow control may affect stage-discharge relation at times.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.63 feet at 9 a. m. January 15 (discharge, 2,080 second-feet); minimum stage recorded, 0.53 foot at 8 a. m. July 19 (discharge, 122 second-feet).

1915–1918: Maximum and minimum stages same as for 1918.

1905–1918: Maximum stage recorded, 3.45 feet at pumping plant at Bend at 7.45 a. m. November 27, 1909 (discharge, 4,820 second-feet; no diversions).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Station is below the intakes of the five large canals (Arnold, Central Oregon, Pilot Butte, North, and Swalley canals) which divert water from Deschutes River near Bend; only small diversions below station. Tables showing combined discharge of river and canals are published herewith.

REGULATION.—Flow regulated by hydroelectric plants at North canal dam and at Bend.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by use of discharge integrator except October 6–21 and November 18 to February 24, for which it was ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, except for periods indicated in footnote to table of daily discharge; also for a few scattered days through the year one daily gage reading has been used. Records good.

Discharge measurements of Deschutes River below Bend, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	Briggs and Batchelder	1.84	1,060	May 30	C. L. Batchelder	1.75	1,010
Nov. 16	R. C. Briggs	2.10	1,330	June 25	R. C. Briggs	1.28	602
Feb. 7	do	2.48	1,830	July 21	do	1.25	564
Apr. 15	F. F. Henshaw	1.89	1,160	26	do	1.03	392

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Daily discharge, in second-feet, of Deschutes River below Bend, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	910			1,710	b1,520	1,210	1,560	1,050	700	460	436	455
2	885			1,710	b1,550	1,390	1,570	980	700	470	414	494
3	875			1,640	b1,370	1,510	1,650	910	690	440	382	480
4	875			1,640	1,290	1,480	b1,410	900	700	400	382	480
5	810			a1,640	1,510	1,470	b1,270	870	690	450	392	440
6	884	900		1,640	1,850	a1,460	b1,210	880	650	400	372	385
7	780			1,710	1,780	a1,440	1,190	810	660	400	382	395
8	798			1,710	1,780	a1,430	1,140	810	660	455	370	450
9	780			1,640	1,780	a1,410	1,150	840	620	435	382	530
10	789			1,570	a1,740	1,400	1,170	860	660	470	370	532
11	772			1,450	1,710	1,350	1,160	860	600	450	395	548
12	768	1,000	1,270	b1,280	1,780	1,330	1,120	835	595	450	376	595
13	763	1,150		b1,280	1,780	1,320	1,110	840	610	455	372	595
14	780	1,300		b1,410	1,510	1,310	1,160	875	825	410	372	634
15	888	1,310		b1,600	1,570	1,340	1,140	926	770	420	372	682
16	1,070	1,360		b1,700	1,570	1,360	1,120	895	610	390	385	710
17	1,070	1,280		1,850	1,450	1,240	1,160	880	630	395	385	700
18	1,070	1,290		1,850	1,450	1,220	1,180	845	b 360	395	380	685
19	1,060	1,290		1,850	1,450	1,300	1,180	897	b 570	370	410	663
20	1,070	1,340		1,780	1,450	1,380	1,180	850	b 580	340	475	655
21	1,050	1,340		1,710	1,510	1,440	1,070	875	b 630	490	480	650
22	1,000	1,290		1,710	1,510	1,370	940	900	b 610	425	520	665
23	1,040	a1,290	1,200	1,710	1,510	1,360	890	870	b 590	455	520	660
24	1,030	a1,290	1,240	1,710	1,510	1,340	890	840	620	521	515	650
25	1,050	1,290	1,640	1,710	1,400	1,340	900	1,070	630	486	b 515	642
26	1,040	1,290	1,710	1,710	1,350	1,440	900	1,080	565	455	b 517	640
27	1,040	1,290	1,780	1,640	1,260	1,600	890	1,040	550	435	b 510	636
28	1,050		1,780	1,640	1,230	1,630	942	1,050	535	447	b 490	633
29		1,290	1,780	1,570	.....	1,540	960	1,070	510	442	b 500	632
30	1,060		1,710	b1,650	.....	1,570	1,100	920	500	442	b 480	643
31			1,710	b1,550	.....	1,640	.....	720	.....	417	b 470	.....

a Interpolated. b Estimated.

NOTE.—Braced figures show estimated mean discharge for period indicated; obtained by comparison with a partial record from Bend Light & Power Co.'s gage and output of plant.

Daily discharge, in second feet, of Deschutes River, including canals, near Bend, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,550			1,740	1,580	1,480	1,580	1,570	1,490	1,380	1,380	1,300
2	1,530			1,740	1,580	1,490	1,580	1,520	1,510	1,400	1,340	1,310
3	1,520			1,670	1,580	1,520	1,670	1,540	1,500	1,380	1,330	1,300
4	1,560			1,670	1,580	1,500	1,620	1,540	1,500	1,340	1,330	1,300
5	1,520			1,680	1,710	1,490	1,580	1,530	1,520	1,380	1,340	1,300
6	1,530	1,350		1,710	1,850	1,480	1,520	1,500	1,480	1,340	1,320	1,280
7	1,480			1,750	1,780	1,460	1,500	1,510	1,510	1,340	1,330	1,270
8	1,500			1,740	1,780	1,450	1,440	1,520	1,520	1,390	1,320	1,320
9	1,500			1,670	1,800	1,430	1,440	1,540	1,500	1,360	1,330	1,340
10	1,450			1,600	1,760	1,420	1,460	1,560	1,550	1,380	1,320	1,320
11	1,430			1,530	1,730	1,370	1,490	1,570	1,490	1,360	1,350	1,330
12	1,420	1,300	1,360	1,600	1,800	1,350	1,500	1,560	1,500	1,350	1,340	1,320
13	1,480	1,350		1,600	1,800	1,370	1,500	1,560	1,510	1,360	1,320	1,310
14	1,410	1,370		1,600	1,530	1,330	1,550	1,570	1,540	1,340	1,330	1,310
15	1,400	1,380		1,600	1,590	1,360	1,530	1,630	1,500	1,350	1,330	1,360
16	1,480	1,370		1,700	1,590	1,400	1,520	1,630	1,500	1,320	1,340	1,360
17	1,480	1,350		1,850	1,470	1,380	1,580	1,630	1,470	1,330	1,330	1,340
18	1,480	1,320		1,890	1,470	1,360	1,630	1,600	1,480	1,320	1,340	1,320
19	1,480	1,400		1,890	1,460	1,350	1,630	1,650	1,490	1,300	1,350	1,320
20	1,460	1,370		1,820	1,460	1,390	1,640	1,520	1,500	1,280	1,360	1,300
21	1,450	1,370		1,740	1,520	1,460	1,580	1,540	1,560	1,360	1,340	1,330
22	1,390	1,320		1,740	1,520	1,410	1,480	1,590	1,540	1,350	1,370	1,310
23	1,430	1,320	1,540	1,740	1,520	1,500	1,470	1,570	1,490	1,370	1,350	1,330
24	1,410	1,320	1,490	1,710	1,530	1,520	1,480	1,520	1,500	1,420	1,350	1,320
25	1,410	1,320	1,660	1,710	1,430	1,530	1,500	1,520	1,540	1,410	1,340	1,310
26	1,400	1,320	1,720	1,710	1,560	1,530	1,500	1,510	1,490	1,390	1,340	1,310
27	1,390	1,320	1,780	1,640	1,500	1,620	1,500	1,460	1,460	1,370	1,330	1,300
28	1,390	1,370	1,810	1,640	1,510	1,650	1,550	1,470	1,460	1,380	1,320	1,300
29	1,380	1,370	1,810	1,570	.....	1,560	1,570	1,520	1,440	1,380	1,320	1,300
30	1,360	1,360	1,740	1,580	.....	1,590	1,480	1,550	1,430	1,370	1,300	1,310
31	1,360	.....	1,740	1,580	.....	1,660	.....	1,500	.....	1,350	1,300	.....

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Monthly discharge of Deschutes River below Bend, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,080	768	940	57,800
November	1,240	.....	1,170	69,600
December	1,780	.....	1,370	84,200
January	1,850	1,280	1,640	101,000
February	1,850	1,230	1,540	85,500
March	1,640	1,210	1,410	86,700
April	1,650	890	1,140	67,800
May	1,080	720	902	55,500
June	825	500	627	37,300
July	521	340	435	26,700
August	520	370	430	26,400
September	710	385	563	34,700
The year	1,850	340	1,010	733,000

Monthly discharge of Deschutes River, including canals, near Bend, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,560	1,360	1,450	89,200
November	1,400	1,300	1,350	80,300
December	1,810	.....	1,460	89,800
January	1,890	1,530	1,690	104,000
February	1,850	1,430	1,610	89,400
March	1,660	1,330	1,470	90,400
April	1,670	1,440	1,540	91,600
May	1,650	1,460	1,550	95,300
June	1,560	1,430	1,500	89,300
July	1,420	1,280	1,360	83,600
August	1,380	1,300	1,340	82,400
September	1,360	1,260	1,310	78,000
The year	1,890	1,260	1,470	1,060,000

DESCHUTES RIVER AT MECCA, OREG.

LOCATION.—In SW. ¼ sec. 20, T. 9 S., R. 13 E., at bridge at Mecca station on Oregon Trunk Railway, Jefferson County, 1½ miles below mouth of Shitike Creek and 12 miles above mouth of Warm Spring River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 7, 1911, to September 30, 1918.

GAGE.—Vertical staff fastened to tree on right bank 75 feet above bridge; read by H. E. Massey.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Rock and gravel; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.8 feet December 29 (discharge, 9,300 second-feet); minimum stage recorded, 2.2 feet August 6 to 10 (discharge, 3,740 second-feet).

1911–1918: Maximum stage recorded, 5.75 feet March 21, 1916 (discharge, 11,700 second-feet); minimum stage recorded, 1.95 feet in August and September, 1915 (discharge, 3,410 second-feet).

ICE.—Stage-discharge relation not affected by ice.

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DIVERSIONS.—Flow affected by same diversions from upper Deschutes River at Bend, Laidlaw, and Cline Falls stations. Summer flow of Crooked River above head of lower canyon near Terrebonne practically all diverted.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined between 3,900 and 9,000 second-feet. Gage read to quarter-tenths daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

Discharge measurements of Deschutes River at Mecca, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	C. L. Batchelder	2.53	4,280	June 27	R. C. Briggs	2.50	4,210
Feb. 18	R. C. Briggs	3.40	5,870	July 22	do	2.40	4,050
Apr. 18	F. F. Henshaw	2.96	5,149	Sept. 27	C. L. Batchelder	2.38	4,030
May 28	C. L. Batchelder	2.70	4,640				

Daily discharge, in second-feet, of Deschutes River at Mecca, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,400	4,580	5,330	6,840	5,720	5,140	6,840	4,760	4,400	3,890	3,890	3,890
2	4,400	4,580	5,140	6,840	5,720	5,330	7,080	4,760	4,400	3,890	3,890	3,890
3	4,220	4,580	4,950	6,840	5,720	5,520	6,600	4,760	4,400	3,890	3,890	3,890
4	4,220	4,400	4,760	6,840	5,920	5,520	6,360	4,760	4,400	3,820	3,890	3,890
5	4,220	4,580	4,760	6,600	6,140	5,520	5,920	4,760	4,400	3,820	3,820	3,890
6	4,140	4,580	4,760	6,600	6,600	5,520	5,720	4,760	4,400	3,890	3,740	3,890
7	4,140	4,580	4,760	6,360	6,840	5,520	5,520	4,760	4,580	3,890	3,740	3,890
8	4,140	4,400	4,760	6,360	7,320	5,520	5,520	4,580	4,580	3,890	3,740	3,890
9	4,140	4,400	4,760	6,360	7,080	5,520	5,520	4,400	4,760	3,970	3,740	3,890
10	4,140	4,400	4,760	6,360	6,360	5,520	5,520	4,400	4,760	4,050	3,740	3,970
11	4,140	4,400	4,760	6,360	6,360	5,520	5,720	4,400	4,760	4,050	3,820	3,970
12	4,140	4,400	4,760	6,840	6,360	5,520	5,520	4,400	4,580	4,050	3,890	3,970
13	4,140	4,760	5,140	6,840	6,360	5,520	5,520	4,400	4,580	4,050	3,890	3,970
14	4,140	4,760	5,140	6,600	6,360	5,520	5,520	4,580	4,400	4,050	3,820	4,580
15	4,220	4,760	5,140	6,840	5,920	5,520	5,330	4,760	4,400	3,970	3,820	4,400
16	4,400	4,760	5,140	6,840	5,920	5,520	5,330	4,760	4,400	3,970	3,820	4,400
17	4,400	4,760	5,330	6,840	5,920	5,520	5,140	4,760	4,400	3,970	3,820	4,400
18	4,400	4,760	6,840	6,840	5,920	5,520	5,140	4,760	4,400	3,970	3,820	4,220
19	4,400	4,580	7,800	6,840	5,920	5,720	5,140	4,580	4,400	3,970	3,820	4,140
20	4,400	4,580	7,320	6,360	5,720	5,920	4,950	4,580	4,400	3,890	3,820	4,140
21	4,400	4,580	6,840	6,360	5,720	6,140	4,950	4,400	4,400	3,970	3,890	4,050
22	4,400	4,580	6,360	6,360	5,720	6,360	4,760	4,400	4,400	4,050	3,890	4,050
23	4,400	4,580	6,360	6,140	5,720	6,600	4,760	4,400	4,400	4,050	3,890	4,050
24	4,400	4,580	6,140	6,140	5,720	6,840	4,760	4,400	4,400	3,970	3,970	3,970
25	4,400	4,760	6,360	6,140	5,720	7,080	4,760	4,400	4,400	3,970	3,970	3,970
26	4,400	4,760	6,840	6,140	5,520	7,320	4,760	4,400	4,400	3,970	4,050	3,970
27	4,400	4,760	7,800	6,140	5,520	7,800	4,760	4,400	4,220	3,970	3,970	3,970
28	4,400	4,760	9,040	6,140	5,330	7,320	4,760	4,580	4,140	3,890	3,970	3,970
29	4,400	4,760	9,800	6,140	.....	6,840	4,760	4,400	4,050	3,890	3,970	4,050
30	4,580	6,360	7,800	5,920	.....	6,840	4,760	4,400	3,970	3,890	3,890	4,050
31	4,580	.....	7,320	5,920	.....	7,080	.....	4,400	.....	3,890	3,890	.....

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Monthly discharge of Deschutes River at Mecca, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4,580	4,140	4,310	265,000
November	6,360	4,400	4,670	278,000
December	9,300	4,760	6,010	370,000
January	6,840	5,920	6,480	398,000
February	7,320	5,330	6,040	335,000
March	7,800	5,140	6,020	370,000
April	7,080	4,760	5,390	321,000
May	4,760	4,400	4,560	280,000
June	4,760	3,970	4,420	263,000
July	4,050	3,820	3,950	243,000
August	4,050	3,740	3,860	237,000
September	4,580	3,890	4,040	240,000
The year	9,300	3,740	4,970	3,600,000

DESCHUTES RIVER AT MOODY, NEAR BIGGS, OREG.

LOCATION.—In SE. ¼ sec. 26, T. 2 N., R. 15 E., opposite Moody railroad station, 1¼ miles above bridge of Oregon-Washington Railroad & Navigation Co., 1½ miles above mouth of river, and 5 miles southwest of Biggs, Sherman County.

DRAINAGE AREA.—About 9,180 square miles.

RECORDS AVAILABLE.—July 7, 1906, to September 30, 1918; October 19, 1897, to December 31, 1899, for a station near Moro, 10 miles above mouth of river in NE. ¼ sec. 5, T. 1 S., R. 16 E. Records for 1908 and 1910 somewhat fragmentary.

GAGE.—Staff in two sections, the lower inclined, the upper vertical; read by Crist Kitto. At the Moro station gage was an inclined staff.

DISCHARGE MEASUREMENTS.—Made from a cable about 450 feet above gage. At Moro station made from the "free bridge" 3 miles below gage.

CHANNEL AND CONTROL.—Rock and gravel; shifting only in floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.3 feet December 29 (discharge, 17,500 second-feet); minimum stage recorded, 2.15 feet on several days during August and September (discharge, 4,080 second-feet).

1906–1918: Maximum stage recorded, 7.50 feet February 6, 1907 (discharge, 30,600 second-feet); minimum stage recorded, 1.9 feet August 18 to September 16, 1915 (discharge, 3,600 second-feet).

ICE.—Stage-discharge relation never affected by ice.

DIVERSIONS.—Summer discharge at this station has been progressively reduced since 1904 or 1905 by diversions from the upper river. Some of this water returns, but the net reduction during midsummer is now probably 15 to 20 per cent.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined between 3,600 and 15,000 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table, except for period indicated in footnote to table of daily discharge. Records excellent.

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Discharge measurements of Deschutes River at Moody, near Biggs, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 26	C. L. Batchelder	2.58	5,470
Sept. 3	R. C. Briggs	2.15	4,020

Daily discharge, in second-feet, of Deschutes River at Moody, near Biggs, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,470	4,750	6,260	9,600	7,300	6,260	8,000	5,940	4,890	4,340	4,200	4,080
2	4,470	4,750	5,940	9,200	6,950	6,260	8,000	5,940	4,890	4,340	4,200	4,080
3	4,470	4,750	5,320	8,400	6,950	6,600	8,000	5,940	4,890	4,340	4,200	4,080
4	4,470	4,750	5,320	9,200	6,950	6,600	7,300	5,940	4,750	4,340	4,200	4,080
5	4,470	4,750	5,030	9,200	6,950	6,260	7,300	5,940	4,890	4,200	4,200	4,080
6	4,470	4,750	5,030	8,800	8,000	6,260	6,600	5,940	4,890	4,200	4,200	4,080
7	4,470	4,750	5,030	8,400	10,500	6,260	6,600	5,620	5,030	4,200	4,200	4,080
8	4,470	4,750	5,030	8,400	9,600	6,260	6,600	5,620	5,030	4,200	4,200	4,080
9	4,470	4,750	5,030	8,000	9,600	6,260	6,600	5,320	5,030	4,200	4,200	4,080
10	4,340	4,890	5,030	8,000	8,800	6,260	6,600	5,620	4,890	4,200	4,200	4,080
11	4,340	4,890	5,030	8,400	8,400	6,260	6,600	5,320	4,890	4,200	4,080	4,080
12	4,340	4,890	5,030	9,600	8,000	6,260	6,600	5,320	4,750	4,200	4,080	4,080
13	4,340	4,890	5,030	8,400	8,000	6,260	6,600	5,320	4,750	4,200	4,080	4,080
14	4,340	4,890	5,030	8,800	8,000	5,940	6,600	5,940	4,750	4,200	4,080	4,080
15	4,340	4,890	5,030	9,200	7,650	6,260	6,260	5,620	4,750	4,200	4,080	4,470
16	4,470	4,890	6,260	9,600	7,300	6,260	5,940	5,320	4,750	4,200	4,080	4,470
17	4,470	4,890	6,600	9,600	7,300	5,940	5,940	5,320	4,750	4,340	4,200	4,340
18	4,470	4,890	8,800	9,200	7,300	6,600	5,940	5,320	4,750	4,340	4,340	4,340
19	4,470	4,890	15,100	8,800	7,300	6,600	5,940	5,320	4,750	4,470	4,340	4,340
20	4,610	4,890	14,000	8,400	6,950	6,600	5,940	5,320	4,750	4,470	4,200	4,340
21	4,610	4,890	8,800	8,000	6,950	6,950	5,940	5,320	4,750	4,340	4,080	4,200
22	4,610	4,890	8,800	8,000	6,600	7,300	5,940	5,320	4,750	4,340	4,200	4,200
23	4,610	4,890	8,800	8,000	6,600	7,300	5,940	5,320	5,750	4,340	4,200	
24	4,610	4,890	9,600	8,000	6,950	7,650	5,940	5,320	4,750	4,340	4,470	
25	4,610	4,890	8,800	7,650	6,600	7,650	5,940	5,320	4,610	4,340	4,470	
26	4,750	4,890	8,800	7,300	6,600	8,000	5,940	5,320	4,610	4,340	4,340	4,200
27	4,750	4,890	8,400	8,000	6,260	8,000	5,940	5,320	4,470	4,340	4,200	
28	4,750	4,890	13,500	8,000	6,600	8,400	5,620	5,320	4,470	4,340	4,200	
29	4,750	5,320	17,500	7,650	.....	8,000	5,620	5,320	4,470	4,340	4,200	
30	4,750	8,400	13,000	7,650	.....	7,650	5,940	5,320	4,470	4,200	4,080	
31	4,750	.....	13,500	7,300	.....	7,650	.....	4,890	.....	4,200	4,080	.....

NOTE.—Braced figure shows estimated mean discharge for period indicated.

Monthly discharge of Deschutes River at Moody, near Biggs, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4,750	4,340	4,530	279,000
November	8,400	4,750	4,980	296,000
December	17,500	5,030	8,010	493,000
January	9,600	7,300	8,480	521,000
February	10,500	6,260	7,530	418,000
March	8,400	5,940	6,800	418,000
April	8,000	5,620	6,420	382,000
May	5,940	4,890	5,480	337,000
June	5,030	4,470	4,760	283,000
July	4,470	4,200	4,290	264,000
August	4,470	4,080	4,200	258,000
September	4,470	4,080	4,180	249,000
The year	17,500	4,080	5,800	4,200,000

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EAST FORK NEAR LAPINE, OREG.

Location.—In sec. 2, T. 22 S., R. 10 E., at wagon bridge at former town of Rosland, 1½ miles north of Lapine, Deschutes County.

Drainage area.—Not measured.

Records available.—September 22, 1910, to October 31, 1913, fragmentary; June 23 to November 2, 1918, when station was discontinued.

Gage.—Vertical staff on downstream side of east bent of bridge; read by Mrs. M. C. Bogue. During 1912 a gage at the Rosland ranger station, 1½ miles below the present gage, was used.

Discharge measurements.—Made from the highway bridge at Rosland or by wading.

Channel and control.—No well defined control; sandy bottom. Banks of earth; are overflowed at high stages.

Extremes of discharge.—Maximum stage recorded during period, 2.20 feet during discharge measurement June 23 (discharge, 300 second-feet); minimum stage recorded, 0.50 foot August 27 to September 9 (discharge, 80 second-feet).

1910–1913; 1918: Maximum stage recorded, 4.6 feet June 12, 1912, from high water marks (discharge, 760 second-feet).

Ice.—Stage-discharge relation affected by ice; no record.

Diversions.—A few small ditches divert water above the station.

Regulation.—None.

Accuracy.—Stage-discharge relation practically permanent during period of records. Rating curve fairly well defined. Gage read once daily to tenths. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of East Fork near Lapine, Oreg., during 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 23	R. C. Briggs	2.20	292	Oct. 22	F. F. Henshaw	0.66	94
July 27	do	.94	115				

Daily discharge, in second-feet, of East Fork near Lapine, Oreg., for the period June 23 to Nov. 2, 1918.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		185	105	80	88	88	15		135	88		96	
2		172	105	80	88	88	16		135	88		96	
3		172	105	80	88		17		135	96		96	
4		159	105	80	88		18		135	96		96	
5		159	105	80	88		19		124	96		96	
							20		124	96		96	
6		159	96	80	105		21		124	96		96	
7		172	96	80	96		22		124	88		90	
8		159	96	80	96		23	300	124	88	88	88	
9		147	96	80	96		24	280	124	88		88	
10		147	96	96	96		25	245	135	88		88	
11		147	96	88	88								
12		147	96	88	88		26	215	135	88		88	
13		147	96	88	88		27	215	126	80		88	
14		147	96	88	88		28	200	114	80		88	
							29	215	114	80		88	
							30	200	105	80		88	
							31		105	80		88	

Note.—Braced figure shows estimated means discharge for period indicated.

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Monthly discharge of East Fork near Lapine, Oreg., for the period June 23 to Oct. 31, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 23-30	300	200	234	3,710
July	185	105	140	8,610
August	105	80	93.1	5,720
September	96	80	85.9	5,110
October	105	88	91.5	5,630
The period				28,800

ARNOLD CANAL NEAR BEND, OREG.

LOCATION.—In SW. ¼ sec. 23, T. 18 S., R. 11 E., 1 mile below intake of canal and 9 miles south of Bend, Deschutes County.

RECORDS AVAILABLE.—April 10, 1914, to September 30, 1918; information sufficient for an approximate estimate, October, 1912, to March, 1914.

GAGE.—Vertical staff on right side of flume 400 feet below a spillway, installed May 12, 1917; staff on left side just below spillway used May 1, 1915, to December 2, 1916. A gage half a mile above, in NE. ¼ sec. 27, was used up to April 30, 1915; read by B. Tekampe.

DISCHARGE MEASUREMENTS.—Made from collar of flume near gage.

CHANNEL AND CONTROL.—Flume 12 to 14 feet wide; fairly steep gradient.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.16 feet 3 p. m. August 17 (discharge, 111 second-feet); canal dry at various times during year.

1914–1918: Maximum stage recorded, 2.18 feet June 23 and 27, 1917 (discharge, 114 second-feet); canal dry at various times during period.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve fairly well defined. Gage read to hundredths about three times weekly. Daily discharge ascertained by applying daily gage height to rating table, except for days when gage was not read, for which it was interpolated. Records good.

Discharge measurements of Arnold canal near Bend, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 17	R. C. Briggs	1.55	62	June 24	R. C. Briggs	1.70	73
Nov. 15	do	1.12	35.0	July 27	do	2.10	103
May 30	C. L. Batchelder	1.67	67				

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Daily discharge, in second-feet, of Arnold canal near Bend, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	May.	June.	July.	Aug.	Sept.
1	74	56	.....	74	102	106	106
2	82	56	.....	74	104	106	106
3	82	56	.....	74	106	106	106
4	82	52	.....	74	106	106	106
5	82	48	.....	82	106	106	102
6	78	44	.....	82	110	106	98
7	78	40	.....	82	110	106	98
8	78	36	.....	94	110	106	98
9	78	36	.....	92	110	106	98
10	78	36	.....	92	110	106	98
11	76	36	.....	90	108	108	98
12	74	36	.....	98	106	110	96
13	74	36	.....	98	110	110	94
14	.....	36	82	102	108	110	94
15	70	36	86	102	106	108	88
16	70	36	90	.....	106	106	82
17	70	36	94	27	106	110	82
18	64	.....	98	98	106	110	82
19	59	.....	98	102	106	110	82
20	53	.....	.....	102	106	108	82
21	54	.....	.....	104	106	106	82
22	55	.....	.....	106	106	106	80
23	56	.....	14	94	106	106	78
24	56	.....	82	82	106	110	78
25	56	.....	82	82	108	108	78
26	56	.....	80	82	110	106	78
27	56	.....	78	82	106	106	78
28	56	.....	78	98	106	106	78
29	56	.....	78	106	106	106	78
30	56	.....	76	104	106	106	78
31	56	.....	74	.....	106	106	.....

NOTE.—Canal dry Oct. 14, Nov. 18 to May 13, May 20-22, and June 16.

Monthly discharge of Arnold canal near Bend, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October (30 days)	82	53	67.2	4,000
November (17 days)	56	36	41.9	1,410
May (15 days)	98	14	79.3	2,360
June (29 days)	106	27	88.9	5,110
July	110	102	107	6,580
August	110	106	107	6,580
September	106	78	89.4	5,320
The year	.....	.....	.....	31,400

CENTRAL OREGON CANAL NEAR BEND, OREG.

LOCATION.—In NE. ¼ sec. 7, T. 18 S., R. 12 E., at flume section half a mile below point where waters in main diversion canal are divided between this canal and Pilot Butte canal, 2 miles south of Bend, Deschutes County.

RECORDS AVAILABLE.—May 11, 1905, to September 30, 1918.

GAGE.—Vertical enameled staff nailed to inside of flume on right side; read by J. A. Watson.

DISCHARGE MEASUREMENTS.—Made from yoke of flume at gage section.

CHANNEL AND CONTROL.—A plank flume of rectangular cross section with battened seams. Flume rather unstable but the rating does not change appreciably.

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EXTREMES OF DISCHARGE.—Maximum stage recorded during year and during period 1905-1918, 3.8 feet during June, July, and August (discharge, 385 second-feet). Canal dry at various times during year.

ICE.—Canal operated in winter but only during periods of moderately cold weather, for furnishing water for domestic use. The velocity of the water passing the gage is sufficient to maintain open channel at all times.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by Central Oregon Irrigation Co.

Central Oregon canal diverts water from the right bank of Deschutes River in NE. ¼ sec. 13, T. 18 S., R. 12 E., and irrigates land lying to the east of Bend and in the vicinity of Powell Buttes.

Discharge measurements of Central Oregon canal near Bend, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 15	F. F. Henshaw	2.18	179
May 30	C. L. Batchelder	3.33	322
June 24	R. C. Briggs	3.60	370

Daily discharge, in second-feet, of Central Oregon canal near Bend, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	246	.....	182	.....	.....	140	.....	272	327	385	385	327
2	246	.....	182	.....	.....	58	.....	272	327	385	370	327
3	246	.....	182	.....	95	.....	.....	299	327	385	385	327
4	285	.....	136	.....	152	.....	89	299	327	385	385	327
5	285	.....	.....	.....	101	.....	146	299	327	385	385	341
6	285	.....	.....	.....	.....	.....	146	299	341	385	385	355
7	285	78	.....	.....	.....	.....	146	313	355	385	385	355
8	285	194	.....	.....	.....	.....	146	327	355	385	385	355
9	285	207	.....	.....	.....	.....	146	327	370	370	385	327
10	285	194	.....	.....	.....	.....	146	327	370	355	385	299
11	285	194	.....	27	.....	.....	146	327	370	355	385	299
12	285	194	.....	170	.....	.....	158	327	385	355	385	272
13	285	105	.....	170	.....	.....	170	327	370	355	385	272
14	285	.....	.....	106	.....	.....	170	285	170	385	385	259
15	95	.....	.....	.....	.....	.....	170	285	272	370	385	246
16	.....	.....	.....	.....	.....	.....	182	313	370	370	385	233
17	.....	.....	.....	.....	.....	.....	207	327	385	370	370	220
18	.....	.....	.....	.....	.....	.....	207	327	385	370	385	220
19	.....	.....	.....	.....	.....	.....	207	327	385	385	370	220
20	.....	.....	.....	.....	.....	.....	207	327	385	385	341	220
21	.....	.....	.....	.....	.....	.....	233	327	385	385	327	246
22	.....	.....	105	.....	.....	14	246	327	385	385	327	246
23	.....	.....	170	.....	.....	97	259	327	355	370	327	246
24	.....	.....	127	.....	.....	140	272	245	355	355	327	246
25	.....	.....	.....	.....	.....	146	272	.....	385	370	327	246
26	.....	.....	.....	.....	97	55	272	.....	385	385	327	246
27	.....	.....	.....	.....	123	.....	272	.....	385	385	327	246
28	.....	.....	.....	.....	140	.....	272	.....	385	385	327	246
29	.....	.....	.....	.....	.....	.....	272	33	385	385	327	246
30	.....	33	.....	.....	.....	.....	272	194	385	385	327	246
31	.....	.....	.....	.....	.....	.....	.....	327	.....	370	327	.....

NOTE.—Canal dry during periods for which no discharge is given.

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Monthly discharge of Central Oregon canal near Bend, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October (15 days)	285	95	264	7,850
November (8 days)	207	33	150	2,380
December (7 days)	182	105	155	2,150
January (4 days)	170	27	118	936
February (6 days)	152	95	118	1,400
March (7 days)	146	14	92.9	1,290
April (27 days)	272	89	201	10,800
May (27 days)	327	33	296	15,900
June	385	170	356	21,200
July	385	355	376	23 100
August	385	327	362	22,300
September	355	220	275	16,400
The year	385	14	284	126,000

PILOT BUTTE CANAL NEAR BEND, OREG.

LOCATION.—In NE. ¼ sec. 7, T. 18 S., R. 12 E., at point in canal directly opposite gaging station on Central Oregon canal, half a mile below point where waters are divided between this canal and Central Oregon canal, and about 2 miles south of Bend, Deschutes County.

RECORDS AVAILABLE.—March 6, 1905, to September 30, 1918.

GAGE.—Vertical staff on right bank; read by J. A. Watson.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Bed composed of gravel and sand. Control partly solid rock; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.90 feet, 6 p. m. July 31 (discharge, 54 second-feet). Canal dry at various times.

1905–1918: Maximum stage recorded 3.10 feet June 8, 11 to 16, July 19 to 21, 1913 (discharge, 244 second-feet). Canal dry at various times.

ICE.—Canal not operated during freezing weather.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve not well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Pilot Butte canal diverts water from the right bank of Deschutes River, in NE. ¼ sec. 13, T. 18 S., R. 12 E., in a flume common to it and the Central Oregon canal, for irrigating lands lying mostly north of Bend and extending nearly to Crooked River. North canal also diverts water into the Pilot Butte.

Discharge measurements of Pilot Butte canal near Bend, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 25	F. F. Henshaw	1.60	24.4
May 30	C. L. Batchelder	1.70	37.9
June 24	R. C. Briggs	1.65	29.5

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Daily discharge, in second-feet, of Pilot Butte canal near Bend, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	.....	20	.....	.....	15	.....	27	31	31	31	31
2	24	.....	18	.....	.....	5	.....	27	31	31	31	31
3	24	.....	18	.....	15	.....	.....	27	31	31	35	31
4	24	.....	13	.....	24	.....	14	27	31	31	40	31
5	24	.....	.....	.....	16	.....	24	27	31	31	40	31
6	24	.....	.....	.....	.....	.....	24	27	27	31	40	31
7	24	11	.....	.....	.....	.....	24	27	27	31	40	31
8	24	24	.....	.....	.....	.....	24	27	27	31	40	31
9	24	24	.....	.....	.....	.....	24	27	31	31	40	31
10	24	24	.....	.....	.....	.....	24	27	31	31	40	31
11	24	24	.....	4	.....	.....	24	27	31	27	40	26
12	24	24	.....	20	.....	.....	26	27	31	20	40	20
13	24	13	.....	20	.....	.....	27	27	31	27	40	20
14	24	.....	.....	12	.....	.....	27	27	31	24	40	20
15	8	.....	.....	.....	.....	.....	27	27	31	40	40	20
16	.....	.....	.....	.....	.....	.....	29	27	31	40	40	20
17	.....	.....	.....	.....	.....	.....	31	27	31	40	40	18
18	.....	.....	.....	.....	.....	.....	31	27	31	35	40	18
19	.....	.....	.....	.....	.....	.....	31	27	31	27	40	18
20	.....	.....	.....	.....	.....	.....	31	27	31	20	40	18
21	.....	.....	.....	.....	.....	.....	31	27	31	18	40	18
22	.....	.....	13	.....	.....	7	31	27	31	18	40	18
23	.....	.....	20	.....	.....	20	27	27	31	21	40	18
24	.....	.....	14	.....	.....	20	27	27	31	18	35	18
25	.....	.....	.....	.....	.....	20	27	27	31	16	31	18
26	.....	.....	.....	.....	20	8	27	27	31	18	31	18
27	.....	.....	.....	.....	15	.....	27	27	31	18	31	18
28	.....	.....	.....	.....	15	.....	27	27	31	18	31	18
29	.....	.....	.....	.....	.....	.....	27	27	31	18	31	18
30	.....	6	.....	.....	.....	.....	27	29	31	18	31	18
31	.....	.....	.....	.....	.....	.....	.....	31	.....	33	31	.....

NOTE.—Canal dry during periods for which no discharge is given.

Monthly discharge of Pilot Butte canal near Bend, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October (15 days)	24	8	22.9	680
November (8 days)	24	6	18.8	296
December (7 days)	20	13	16.6	230
January (4 days)	20	4	14.0	111
February (6 days)	24	15	17.5	208
March (7 days)	20	5	13.6	189
April (27 days)	31	14	26.7	1,430
May	31	27	27.2	1,670
June	31	27	30.6	1,820
July	40	16	26.6	1,640
August	40	31	37.1	2,280
September	31	18	22.9	1,360
The year	40	4	26.5	11,900

NORTH CANAL NEAR BEND, OREG.

LOCATION.—In NE. ¼ sec. 29, T. 17 S., R. 13 E., 500 feet below bridge on road to Tumalo, a quarter of a mile below intake, and 1 mile north of Bend, Deschutes County.

RECORDS AVAILABLE.—June 14, 1913, to September 30, 1918.

GAGE.—Painted on left side of concrete lining of flume; read by W. L. Beebe.

DISCHARGE MEASUREMENTS.—Made from plank across canal.

CHANNEL AND CONTROL.—Concrete-lined section extends about 1,000 feet below gage; below this point the canal is unlined and sides and bottom are very rough. Changes in unlined section affect stage-discharge relation.

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EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.7 feet July 29; July 25 to August 11; August 14 to 18 (discharge, 340 second-feet). Canal dry at various times.

1913–1918: Maximum stage recorded same as for 1918; also occurred during parts of July, August, and September, 1917. Canal dry at various times during period.

ICE.—Only a small quantity of water diverted in winter for stock; stage-discharge relation not affected by ice.

ACCURACY.—Stage-discharge relation changed during June, probably by rocks falling into canal. Two well-defined rating curves used, one applicable before, the other after June 11. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except November to March, for which they are good.

North canal diverts water from the right bank of Deschutes River at a concrete dam about 60 feet high, in NE. ¼ sec. 29, T. 17 S., R. 13 E., and extends eastward for about a mile, where it discharges the water into Pilot Butte canal.

Discharge measurements of North canal near Bend, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	Briggs and Wright	4.90	278	May 30	C. L. Batchelder	5.05	282
Feb. 8	R. C. Briggs	2.35	95	June 24	R. C. Briggs	5.60	332
Apr. 16	F. F. Henshaw	3.29	156				

Daily discharge, in second-feet, of North canal near Bend, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	229	197	147	.....	33	106	9	176	294	321	340	304
2	229	189	161	.....	.....	26	.....	253	303	331	340	313
3	229	189	168	.....	74	.....	.....	253	303	331	340	322
4	229	189	84	.....	119	.....	84	269	303	331	340	322
5	253	189	.....	10	84	.....	119	277	321	331	340	322
6	253	189	.....	41	.....	.....	119	294	321	331	340	322
7	253	189	.....	12	.....	.....	119	312	321	331	340	322
8	253	189	.....	.....	.....	.....	106	303	330	331	240	322
9	269	175	.....	.....	.....	.....	100	285	330	331	340	313
10	277	154	.....	.....	.....	.....	100	285	330	331	340	304
11	277	154	.....	17	.....	.....	126	303	330	331	340	295
12	277	.....	.....	133	.....	5	154	312	331	331	331	286
13	277	.....	.....	126	.....	33	154	312	331	331	331	286
14	277	.....	.....	70	.....	.....	154	253	331	331	340	260
15	285	.....	.....	.....	.....	.....	154	253	331	331	340	260
16	277	.....	.....	.....	.....	20	154	253	331	331	340	260
17	277	.....	.....	.....	.....	126	154	253	331	331	340	260
18	277	.....	.....	.....	.....	119	175	253	331	331	340	260
19	277	77	.....	.....	.....	30	175	253	331	331	331	260
20	277	.....	.....	.....	.....	.....	175	253	331	340	313	268
21	277	.....	.....	.....	.....	.....	205	253	331	277	304	277
22	277	.....	88	.....	.....	.....	221	277	331	331	295	277
23	277	.....	133	.....	3	.....	253	277	331	333	277	277
24	269	.....	94	.....	11	.....	253	277	331	331	277	277
25	253	.....	.....	.....	26	.....	253	285	331	340	277	277
26	253	.....	.....	.....	82	.....	261	269	331	340	277	277
27	245	.....	.....	.....	94	.....	269	261	331	340	277	277
28	237	50	.....	.....	112	.....	269	261	331	340	277	277
29	221	50	.....	.....	.....	.....	269	261	331	340	277	277
30	197	.....	.....	.....	.....	.....	33	285	331	340	286	277
31	197	.....	.....	1	.....	.....	.....	294	.....	340	295	.....

NOTE.—Canal dry during periods for which no discharge is given.

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Monthly discharge of North canal near Bend, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	285	197	257	15,800
November (14 days)	197	50	156	4,330
December (7 days)	168	84	125	1,740
January (8 days)	133	1	51.2	812
February (10 days)	119	3	63.8	1,270
March (8 days)	126	5	58.1	922
April (28 days)	269	9	165	9,150
May	312	176	271	16,700
June	331	294	326	19,400
July	340	277	332	20,400
August	340	277	318	19,600
September	322	260	288	17,100
The year	340	1	248	127,000

SWALLEY CANAL NEAR BEND, OREG.

LOCATION.—In NE. ¼ sec. 29, T. 17 S., R. 12 E., 100 yards above road crossing, a quarter of a mile below intake of canal at North canal dam, and 1½ miles north of Bend, Deschutes County.

RECORDS AVAILABLE.—June 1, 1913, to September 30, 1918.

GAGE.—Vertical staff on right bank at lower end of intake flume; read by W. L. Beebe.

DISCHARGE MEASUREMENTS.—Made from plank across flume.

CHANNEL AND CONTROL.—Earth canal of regular cross section; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.30 feet at 7 a. m. August 12 (discharge, 102 second-feet). Canal dry at various times.

1913–1918: Maximum stage recorded same as for 1918; also occurred at 5 p. m. July 10, 1917. Canal dry at various times during period.

ICE.—Stage-discharge relation not affected by ice; canal not operated during extremely cold weather.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well-defined. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Swalley canal diverts water from the right bank of Deschutes River at North Canal dam in the NE. ¼ sec. 29, and irrigates the lands of the Deschutes Reclamation & Irrigation Co., north of Bend and west of the Pilot Butte tract.

Discharge measurements of Swalley canal near Bend, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	Briggs and Wright	1.75	62	May 29	C. L. Batchelder	1.55	49.9
Nov. 16	do	1.22	33.3	June 24	R. C. Briggs	2.05	80
Apr. 16	F. F. Henshaw	1.24	29.4				

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Daily discharge, in second-feet, of Swalley canal near Bend, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	65	48	33	26	28	10	10	43	68	75	82	72
2	65	48	33	28	28	10	12	40	79	75	82	72
3	65	48	33	28	23	10	28	48	72	82	79	68
4	65	48	33	28	.....	18	23	48	68	82	79	68
5	62	48	33	28	.....	18	23	53	68	79	82	68
6	59	46	33	28	.....	18	18	53	62	82	79	65
7	59	43	30	28	.....	23	18	48	65	86	79	68
8	59	43	28	28	.....	18	20	53	59	82	79	65
9	59	43	.....	28	23	18	23	59	62	86	79	46
10	.....	43	.....	28	23	18	18	59	68	86	75	59
11	.....	48	23	28	23	18	33	53	72	86	82	62
12	.....	43	18	.....	23	18	43	56	65	86	94	53
13	59	43	20	.....	20	18	38	50	72	86	86	43
14	59	33	20	.....	18	18	38	50	79	86	82	40
15	62	33	18	.....	18	18	38	56	75	86	86	59
16	65	33	18	.....	18	18	38	50	72	86	79	56
17	65	33	18	.....	18	18	33	50	68	96	82	56
18	65	33	23	38	18	18	36	48	75	82	86	59
19	65	33	23	38	14	16	36	48	72	86	86	59
20	65	33	18	38	6	14	43	59	75	90	86	56
21	65	33	18	28	5	23	43	53	79	86	82	59
22	56	33	18	28	5	23	43	56	79	86	82	28
23	53	33	20	28	5	23	38	53	86	86	79	48
24	53	33	18	.....	5	23	43	53	82	86	86	50
25	53	33	18	.....	6	23	43	56	86	86	82	50
26	53	33	9	.....	6	23	43	53	82	86	82	48
27	53	33	.....	.....	8	23	46	53	79	86	79	48
28	50	33	30	.....	10	23	43	50	79	86	90	48
29	43	33	28	.....	.....	23	43	53	82	86	82	48
30	43	33	26	33	.....	23	48	48	75	82	75	48
31	48	.....	28	28	.....	23	.....	50	.....	86	72	.....

Note.—Canal dry during periods for which no discharge is given.

Monthly discharge of Swalley canal near Bend, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October (28 days)	65	43	58.3	3,240
November	48	33	38.3	2,280
December (28 days)	33	9	22.9	1,330
January (19 days)	38	26	29.7	1,120
February (23 days)	28	5	15.3	698
March	23	10	19.0	1,170
April	48	10	33.2	1,980
May	59	40	52.0	3,200
June	86	59	73.5	4,370
July	90	75	84.4	5,190
August	94	72	81.8	5,030
September	72	28	55.6	3,310
The year	94	5	48.5	32,900

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TUMALO CREEK NEAR BEND, OREG.

LOCATION.—In SE. ¼ sec. 23, T. 17 S., R. 11 E., a quarter of a mile above diversion dam of feed canal of Tumalo project, half a mile below highway bridge on Bend-Sisters road, 4 miles above mouth, and 4 miles northwest of Bend, Deschutes County.

DRAINAGE AREA.—57 square miles.

RECORDS AVAILABLE.—October 6, 1906, to September 30, 1918. Until May, 1914, this station was maintained only during winter.

GAGE.—April 27, 1915, to September 30, 1917, Stevens continuous water-stage recorder referred to vertical staff nailed to overhanging stump. Staff gage read November, 1910, to April 26, 1915, and during 1918; read by F. H. Dayton and W. H. Gemmell. Previous records at different site.

DISCHARGE MEASUREMENTS.—At ordinary stages, made by wading near the gage or from foot bridge across canal; at flood stages, from a large tree fallen across stream about 200 yards below gage.

CHANNEL AND CONTROL.—Rocks and gravel; not likely to shift greatly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.75 feet at 7 a. m. December 29 (discharge, 500 second-feet); minimum stage recorded, 1.18 feet November 23 to 27 (discharge, 47 second-feet; total, including diversions, about 62 second-feet.

1906–1918: Maximum stage recorded, 3.8 feet at old gage, November 14, 1906 (discharge, estimated from extension of rating curve, 820 second-feet). The peak of the flood of November, 1909, was probably considerably greater. Minimum stage recorded, 0.95 foot at 7 a. m. March 20, 1917 (discharge, 31 second-feet).

ICE.—Stage-discharge relation considerably affected by ice.

DIVERSIONS.—Columbia Southern canal diverts water above the station. From July 18 to September 30 water was diverted into the head of Tumalo Creek from Crater Creek, a tributary of Deschutes River; no data available as to amount of water diverted from Crater Creek.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined between 45 and 300 second-feet. Gage read to quarter-tenths twice daily October 1 to April 16 and June 2 to July 18; high-water peaks which occurred at night observed June 5 to July 1. Daily discharge ascertained as follows: December 14 to January 21, January 30 to March 16, and April 9 to 16 by applying to rating table the mean of two daily gage readings; June 2 to 30 by applying to rating table mean daily gage height obtained by adding twice the two gage readings to the maximum and dividing by 5. October 1 to December 13, January 22–29, March 17 to April 8, and July 1 to September 30, all water was diverted in Tumalo feed canal, and discharges observed in canal have been used (see p. 34). April 17 to May 31 by adding to the discharge observed in the feed canal, the overflow at diversion dam as observed on a gage just below intake. Records excellent except for a few days of considerable fluctuation in stage.

Discharge measurements of Tumalo Creek near Bend, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	C. L. Batchelder	1.28	56	Apr. 16	F. F. Henshaw	1.37	[a]71
Nov. 16	R. C. Briggs	1.20	55.4	May 29	C. L. Batchelder	1.60	[a]111
16	do	1.20	[a] 47.9	30	do	1.80	[a]16
Feb. 9	do	1.38	72	June 25	R. C. Briggs	1.72	[a]131
12	do	1.39	[a] 71	July 18	do	1.38	[a]7

[a] Measured in canal and referred to creek gage.

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Daily discharge, in second-feet, of Tumalo Creek near Bend, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	57	50	57	190	[a] 76	60	70	136	176	143	88	61
2	57	50	54	160	[a] 74	66	65	142	184	138	88	57
3	57	50	50	175	72	57	65	175	187	116	78	54
4	57	50	50	209	78	59	65	175	206	111	74	56
5	57	50	50	148	81	[a] 59	65	138	255	111	74	57
6	57	50	50	160	108	[a] 59	61	121	308	111	65	57
7	57	50	50	160	92	[a] 58	65	130	342	101	65	57
8	57	50	50	135	78	[a] 58	65	159	360	101	70	57
9	57	50	50	148	72	58	83	138	360	96	61	57
10	54	50	50	148	74	59	83	121	342	96	74	57
11	57	50	50	124	72	66	83	132	360	88	83	59
12	57	50	54	148	74	59	83	143	360	88	74	61
13	57	50	54	112	78	59	81	141	400	83	70	57
14	57	50	71	112	[a] 74	59	78	166	290	83	74	57
15	57	50	83	112	[a] 69	59	71	132	216	83	70	59
16	54	50	83	130	[a] 64	59	70	132	181	83	65	61
17	50	50	96	124	60	57	74	121	169	78	57	57
18	50	50	112	117	59	57	74	121	142	78	57	57
19	50	50	112	112	60	54	78	111	196	101	57	57
20	50	50	102	140	[a] 61	54	83	111	222	92	57	57
21	50	47	102	117	[a] 62	54	92	111	290	83	57	57
22	50	47	102	92	[a] 63	54	101	121	238	74	65	57
23	50	47	102	92	[a] 64	57	106	126	255	92	65	57
24	50	47	102	92	65	57	111	126	163	83	65	57
25	50	47	108	101	[a] 63	61	116	121	175	78	61	57
26	50	47	148	92	[a] 61	61	106	116	148	78	57	57
27	50	47	184	92	80	57	106	106	206	74	57	57
28	50	50	440	83	58	57	111	101	166	74	57	57
29	50	61	440	83	.....	57	116	124	160	83	57	57
30	50	83	290	[a] 81	.....	65	127	165	135	83	57	57
31	50	.....	222	[a] 79	.....	70	.....	171	.....	83	57	.....

[a] Stage-discharge relation affected by ice; discharge estimated.

Monthly discharge of Tumalo Creek near Bend, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	57	50	53.4	3,280
November	83	47	50.8	3,020
December	440	50	115	7,070
January	209	79	125	7,690
February	108	58	70.4	3,910
March	70	54	58.9	3,620
April	127	61	85.1	5,060
May	175	101	133	8,180
June	400	135	240	14,300
July	143	74	92.5	5,690
August	88	57	66.3	4,080
September	61	54	57.4	3,420
The year	440	47	95.7	69,300

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Monthly discharge of Tumalo Creek and Columbia Southern canal less Crater Creek canal, near Bend, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	72	65	68.4	4,210
November	99	63	66.8	3,970
December	455	65	130	7,990
January	224	94	140	8,610
February	122	72	84.4	4,690
March	85	69	73.9	4,540
April	142	76	100	5,950
May	191	117	149	9,160
June	498	149	300	17,900
July	165	69	101	6,210
August	88	55	65.8	4,050
September	70	60	64.4	3,830
The year	498	55	112	81,100

NOTE.—Diversion in Crater Creek canal estimated as 20 second-feet July 19 to 31, 14 second-feet in August, and 7 second-feet in September. Maxima and minima October to May computed by assuming the flow of the Columbia Southern canal to have been steady during the month.

COLUMBIA SOUTHERN CANAL NEAR TUMALO, OREG.

LOCATION.—In sec. 1, T. 18 S., R. 10 E., 200 feet below highway bridge across canal on Tumalo Creek road, 1 mile below head gates, 9 miles west of Bend, and 12 miles southwest of Tumalo, Deschutes County.

RECORDS AVAILABLE.—May 15, 1906, to May 23, 1914; May 5 to June 28, 1916; October 1, 1917, to September 30, 1918; also estimates in connection with Tumalo Creek station, beginning October 24, 1916.

GAGE.—Stevens continuous water-stage recorder on left bank referred to vertical staff; inspected by W. H. Gemmell.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading at gage.

CHANNEL AND CONTROL.—Canal is earth cut about 30 feet wide and 4 feet deep. Control not well defined but probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.90 feet June 14 (discharge, 105 second-feet); canal dry at times.

1906–1914; 1916–1918: Maximum discharge recorded, 126 second-feet during July and August, 1907. Canal dry at times.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the daily gage reading June 1 to 25, and the mean daily gage height obtained by inspecting recorder graph June 26 to September 19. Records excellent for period when recorder operated. Monthly estimates explained in footnote to table of monthly discharge.

Columbia Southern canal diverts water from Tumalo Creek in SE. ¼ sec. 2, T. 18 S., R. 10 E. for irrigation on the Tumalo project. It has been operated since 1916 primarily to furnish water to a sawmill; most of the water eventually finds its way back to the canals of Tumalo project.

Discharge measurements of Columbia Southern canal near Tumalo, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 10	R. C. Briggs		13.7	June 25	R. C. Briggs	1.40	48.6
June 1	C. L. Batchelder	0.95	17.2	July 20	do	.98	16.5

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Daily discharge, in second-feet, of Columbia Southern canal near Tumalo, Oreg., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	16	22	14	13	16	84	16	13	14
2	16	22	14	13	17	91	16	13	14
3	17	21	14	13	18	91	16	14	15
4	27	21	14	13	19	78	17	14	16
5	42	20	14	12	20	78	17	14	
					21	91	17	14	
6	48	17	15	12	22	84	17	14	
7	44	17	15	12	23	60	17	14	
8	48	16	15	12	24	55	18	14	
9	48	16	14	12	25	55	18	13	14
10	84	16	12	15					
					26	72	17	13	
11	91	16	13	16	27	28	16	13	
12	98	16	13	16	28	17	15	13	
13	98	17	13	16	29	14	14	12	
14	105	16	13	16	30	14	14	13	
15	84	16	13	16	31	.....	14	13	.....

NOTE.—Braced figure shows estimated mean discharge for period indicated.

Monthly discharge of Columbia Southern canal near Tumalo, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	15.0	922
November	.....	.....	16.0	952
December	.....	.....	15.0	922
January	.....	.....	15.0	922
February	.....	.....	14.0	778
March	.....	.....	15.0	922
April	.....	.....	15.0	893
May	.....	.....	16.0	984
June	105	14	59.3	3,530
July	22	14	17.0	1,060
August	15	12	13.5	830
September	16	12	14.0	833
The year	105	.....	18.7	13,500

NOTE.—Mean discharge for October and November estimated from records at Pine Tree Lumber Co.'s sawmill: for February from measurement of Feb. 10; for December, January, and March to May flow was practically constant.

TUMALO FEED CANAL NEAR BEND, OREG.

LOCATION.—In SE. ¼ sec. 23, T. 17 S., R. 11 E., in concrete-lined section, 300 feet below diversion dam, half a mile below bridge across Tumalo Creek on road from Bend to Sisters, and 4 miles from Bend, Deschutes County.

RECORDS AVAILABLE.—May 21, 1914, when water was first diverted, to September 30, 1918.

GAGE.—Painted on sloping concrete lining. Stevens continuous water-stage recorder used March 29 to May 29; inspected by F. H. Dayton and W. H. Gemmell.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Trapezoidal concrete section; the control is the sand trap just above intake to a steel flume.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.55 feet at 7.30 p. m. June 9 (discharge, 184 second-feet). Canal dry at various times.

1914-1918: Maximum stage recorded, 3.80 feet May 4, 5, and 6, 1916 (discharge, 219 second-feet). Canal dry at various times.

ICE.—Headgates closed in extremely cold weather.

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ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined. Gage read to half-tenths twice daily. Daily discharge ascertained, October 1 to March 28, and May 30 to August 24, by applying to rating table the mean of two daily gage readings; March 29 to May 29, by applying to rating table the mean daily gage height obtained by inspecting recorder graph; August 25 to September 30, by applying to rating table the gage reading for days when gage was read and interpolating for days between. Records excellent.

Tumalo feed canal diverts water from Tumalo Creek in SE. ¼ sec. 23, T. 17 S., R. 11 E., for irrigation on the Tumalo project.

Discharge measurements of Tumalo feed canal near Bend, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	C. L. Batchelder	2.30	56	Apr. 16	F. F. Henshaw	2.40	71
Nov. 16	R. C. Briggs	2.16	47.9	May 29	C. L. Batchelder	2.90	111
Feb. 9	do	2.00	41.1	30	do	3.32	165
9	do	1.60	21.2	June 25	R. C. Briggs	3.15	121
12	do	2.45	70	July 18	do	2.52	76

Daily discharge, in second-feet, of Tumalo feed canal near Bend, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	57	50	57	101	.....	57	70	132	166	143	88	61
2	57	50	54	101	.....	57	65	132	160	138	88	57
3	57	50	50	92	18	57	65	143	166	116	78	54
4	57	50	50	101	74	57	65	138	178	111	74	56
5	57	50	50	101	74	56	65	138	178	111	74	57
6	57	50	50	96	92	56	61	121	178	111	65	57
7	57	50	50	101	83	55	65	121	178	101	65	57
8	57	50	50	96	74	55	65	154	178	101	70	57
9	57	50	50	88	54	54	70	138	178	96	61	57
10	54	50	50	88	70	57	70	121	178	96	74	57
11	57	50	50	101	74	57	70	132	178	88	83	59
12	57	50	54	101	43	35	74	143	178	88	74	61
13	57	50	54	96	.....	.....	70	132	178	83	70	57
14	57	50	57	96	.....	.....	57	138	172	83	74	57
15	57	50	65	96	.....	.....	65	132	166	83	70	59
16	54	50	74	101	.....	21	70	132	166	83	65	61
17	50	50	83	92	.....	57	74	121	166	78	57	57
18	50	50	92	101	.....	57	74	121	154	78	57	57
19	50	50	92	101	.....	54	78	111	160	101	57	57
20	50	50	88	121	.....	54	83	111	160	92	57	57
21	50	47	88	101	.....	54	92	111	178	83	57	57
22	50	47	88	92	.....	54	101	121	166	74	65	57
23	50	47	88	92	.....	57	106	126	172	92	65	57
24	50	47	88	92	.....	57	111	126	154	83	65	57
25	50	47	92	101	16	61	116	121	154	78	61	57
26	50	47	143	92	38	61	106	116	143	78	57	57
27	50	47	154	92	57	57	106	106	172	74	57	57
28	50	50	143	83	57	57	111	101	166	74	57	57
29	50	61	88	83	.....	57	116	121	154	83	57	57
30	50	83	106	55	.....	65	126	154	143	83	57	57
31	50	.....	101	.....	.....	70	.....	166	.....	83	57	.....

NOTE.—Stage-discharge relation affected by ice Mar. 5–8; discharge estimated. Canal dry during periods for which no discharge is given.

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Monthly discharge of Tumalo feed canal near Bend, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	57	50	53.4	3,280
November	83	47	50.8	3,020
December	154	50	77.4	4,760
January (30 days)	121	55	95.1	5,660
February (14 days)	92	16	58.9	1,640
March (28 days)	70	21	55.2	3,070
April	126	57	82.2	4,890
May	166	101	128	7,870
June	178	143	167	9,940
July	143	74	92.5	5,690
August	88	57	66.3	4,080
September	61	54	57.4	3,420
The year				57,300

SQUAW CREEK NEAR SISTERS, OREG.

LOCATION.—In NW. ¼ sec. 32, T. 15 S., R. 10 E., immediately above intake of McCallister ditch and 5 miles by road above Sisters, Deschutes County.

DRAINAGE AREA.—63 square miles.

RECORDS AVAILABLE.—May 30 to December 31, 1913; April 7 to September 13, 1914; March 24 to December 13, 1916; April 5 to December 5, 1917; and March 1 to September 30, 1918. From July 1, 1906, to May 23, 1913, in sec. 29, at station below intake of McCallister ditch, about 700 feet farther downstream.

GAGE.—Stevens eight-day water-stage recorder on right bank; inspected by watermasters. Vertical staff read prior to 1916.

DISCHARGE MEASUREMENTS.—Made from cable about 100 yards above gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders which shifted during winter of 1917–18.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.50 feet at 10 p. m. June 13 (discharge, 490 second-feet) but was probably higher in December; minimum stage recorded, 1.94 feet at noon November 15 (discharge, 49 second-feet).

1906–1918: Maximum stage recorded, 7.5 feet at old station, November 22, 1909 (discharge, estimated from extension of rating curve, 1,940 second-feet); minimum stage recorded, 2.65 feet at old station, March 19, 1912 (discharge, 32 second-feet).

DIVERSIONS.—Pole Creek, a tributary of Squaw Creek from the west, has been diverted for irrigation. The diversion canal has been eroded until it carries the entire flow of this creek. Low-water flow entirely diverted below the station.

REGULATION.—None.

ACCURACY—Stage-discharge relation changed during high water of December and January, while records were suspended. Two well-defined rating curves used, applicable October 1 to December 5 and March 1 to September 30. Record from water-stage recorder contains several gaps, but estimates of discharge for those periods are considered reliable. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting recorder graph, except for periods indicated in footnote to table of daily discharge. Records good.

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Discharge measurements of Squaw Creek near Sisters, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 30	Kennard [a] and Cox	2.00	56	May 31	Batchelder and Kennard	2.55	118
Apr. 16	F. F. Henshaw	2.28	70	July 19	Briggs and Ellis [a]	2.79	162
16	do	2.29	63				
May 11	H. G. Kennard	2.42	90				

[a] Water masters.

Daily discharge, in second-feet, of Squaw Creek near Sisters, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	100	60	84	67	64	93	115		166	175
2	98	60	67		62	101	120		169	166
3	90	77	69		[a]67	126	130		154	142
4	96	64	64		72	139	148		169	128
5	98	64	63		72	118	166		148	130
6	98	59		60	71	101	190		142	125
7	90	57			71	103	220		151	112
8	90	56			71	110	238		148	125
9	90	55			78	99	255		126	154
10	86	56			74	93	295	230	163	139
11	86	56		61	72	93	340		169	139
12	84	57		61	[a]70	101	365		145	142
13	81	54		59	[a]69	115	440		136	175
14	79	52		57	[a]67	120	390		142	193
15	81	52		57	[a]65	99	295		120	184
16	74	51		55	64	95	255		99	151
17	64	54		57	64	93	255		87	145
18	64	54		62	64	91	255			145
19	64	54		61	64	87	275	205		160
20	63	52		57	69	87	275	187		160
21	67	54		55	76	81	365	175	150	142
22	70	52		57	80	85	365	163		118
23	70	51		59	81	95	318	166		95
24	64	51		61	85	91	318	145	206	93
25	64	[a]52		64	85	89	275	142	184	97
26	62	[a]53		65	78	83	255	151	178	95
27	63	[a]53		64	76	80	275	130	169	97
28	56	54		61	80	76		133	145	106
29	63	148		61	83	103		154	142	122
30	60	168		62	89	122		181	148	110
31	59			64		125		175	172	

[a] Interpolated.

NOTE.—Braced figures show estimated mean discharge for periods indicated. Records suspended during winter.

Monthly discharge of Squaw Creek near Sisters, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	100	56	76.8	4,720
November	168	51	62.7	3,730
December 1–5	84	63	69.4	688
March	67		60.2	3,700
April	89	62	72.8	4,330
May	139	76	99.8	6,140
June	440	115	267	15,900
July		130	202	12,400
August			151	9,280
September	193	93	135	8,030

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SQUAW CREEK CANAL NEAR SISTERS, OREG.

LOCATION.—In SW. ¼ sec. 28, T. 15 S., R. 10 E., half a mile below intake and 4 miles by road south of Sisters, Deschutes County.

RECORDS AVAILABLE.—Irrigating seasons, 1916 to 1918.

GAGE.—Stevens eight-day water-stage recorder on right side of canal, a short distance below a wasteway; inspected by water masters.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Channel is excavated in gravelly soil; slightly shifting; a timber placed across canal just below gage forms a control for low water, but has little effect at ordinary stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.00 feet at 3 a. m. July 30, 1918 (discharge, 138 second-feet); canal dry during winter.

1916–1918: Maximum stage recorded, 2.22 feet, July 10, 1917 (discharge, 182 second-feet).

ACCURACY.—Stage-discharge relation changed during winter. Two well-defined rating curves used applicable respectively October 1 to 27 and May 1 to September 30. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting recorder graph, except for periods indicated in footnote to table of daily discharge. Records excellent.

Squaw Creek canal diverts water from Squaw Creek in SE. ¼ sec. 29, T. 15 S., R. 10 E., and irrigates land east and north of Sisters; 8,328 acres have been adjudicated a water right under it.

Discharge measurements of Squaw Creek canal near Sisters, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 31	Batchelder and Kennard [a]	1.48	59
June 8	H. G. Kennard [a]	1.77	100
July 19	Briggs and Ellis [a]	1.70	91

[a] Water masters.

Daily discharge, in second-feet, of Squaw Creek canal near Sisters, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1	37	44	56	93	110	72	16	35	44	94	104	77	38
2	39	43	57	103	110	70	17	[a] 36	42	94	100	68	37
3	41	50	58	113	118	62	18	[a] 37	42	93	108	62	39
4	41	51	65	111	108	57	19	38	41	98	107	62	40
5	44	37	69	105	96	55	20	39	41	98	100	56	40
6	44	18	76	110	96	50	21	40	39	104	105	56	42
7	41	18	96	111	98	47	22	41	40	98	93	55	40
8	41	29	105	118	100	51	23	42	48	94	98	62	35
9	40	35	110	118	94	55	24	40	48	93	94	93	40
10	39	39	113	121	108	50	25	39	47	89	90	94	
11	38	43	94	[a] 118	107	46	26	36	46	92	111	89	
12	37	50	[a] 100	[a] 114	98	50	27	36	44	96	108	89	
13	37	52	[a] 100	111	94	52	28	.....	47	96	108	83	47
14	36	54	105	123	98	47	29	.....	55	90	116	80	54
15	36	49	96	118	83	44	30	.....	58	90	128	80	50
							31	.....	58	.....	124	68	.....

[a] Interpolated.

NOTE.—Canal probably dry Oct. 28 to Apr. 30. Mean discharge estimated Sept. 24 to 27.

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Monthly discharge of Squaw Creek canal near Sisters, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-27	.....	.....	38.9	2,080
May	58	18	43.6	2,680
June	113	56	90.6	5,390
July	128	90	109	6,700
August	118	55	86.8	5,340
September	72	.....	47.7	2,840
The year	.....	.....	.....	25,000

NOTE.—Canal probably dry Oct. 28 to Apr. 30.

CROOKED RIVER NEAR CULVER, OREG.

LOCATION—In NW. ¼ sec. 11, T. 12 S., R. 12 E., an eighth of a mile below Cove power plant and 6 miles west of Culver, Jefferson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Inclined staff on left bank 100 feet below highway bridge; read by A. C. Thompson and A. K. McAlpine.

DISCHARGE MEASUREMENTS.—Made from cable half a mile below gage.

CHANNEL AND CONTROL.—Bed and control composed of boulders; probably permanent. Banks rocky.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.40 feet at noon March 25 (discharge, 3,300 second-feet); minimum stage recorded, 1.70 feet during parts of June and August, and all of July and September (discharge, 1,100 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Practically all the summer flow of Crooked River above Prineville is diverted for irrigation. Low-water flow at this station comes from springs a few miles above station.

REGULATION.—Slight regulation by power plant above gage and storage reservoir on Ochoco project.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage reading to rating table, except for periods indicated in footnote to table of daily discharge. Records excellent.

Discharge measurements of Crooked River near Culver, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 17	C. L. Batchelder	1.80	1,110
Apr. 17	F. F. Henshaw	2.35	1,580
June 27	R. C. Briggs	1.75	1,110

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Daily discharge, in second-feet, of Crooked River near Culver, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	[a]1,120	1,120	1,210	1,390	1,460	1,460	2,900	1,270	1,210	1,100	1,100	1,100
2	1,120	1,120	1,210	1,330	1,460	1,460	2,810	1,210	1,150	1,100	1,100	1,100
3	[a]1,120	1,120	1,210	1,330	1,460	1,390	2,450	1,210	1,150	1,100	1,100	1,100
4	[a]1,120	1,120	1,210	1,330	1,460	1,390	2,270	1,210	1,150	1,100	1,100	1,100
5	[a]1,120	1,120	1,210	1,330	1,460	1,460	2,090	1,210	1,150	1,100	1,100	1,100
6	[a]1,120	1,120	1,210	1,390	1,460	1,530	2,090	1,210	1,150	1,100	1,100	1,100
7	[a]1,120	1,120	1,210	1,390	1,460	1,530	1,930	[a]1,210	1,150	1,100	1,100	1,100
8	[a]1,120	1,120	1,210	1,390	2,010	1,460	1,930	[a]1,210	1,150	1,100	1,100	1,100
9	[a]1,120	1,120	1,210	1,460	1,930	1,460	1,850	[a]1,210	1,150	1,100	1,100	1,100
10	1,120	1,120	1,210	1,460	1,770	1,460	1,930	[a]1,210	1,150	1,100	1,100	1,100
11	1,120	1,120	1,210	1,390	1,610	1,460	2,010	[a]1,210	1,150	1,100	1,100	1,100
12	1,120	1,120	1,210	1,390	1,530	1,460	2,010	1,210	1,150	1,100	1,100	1,100
13	1,120	1,120	1,210	1,390	1,530	1,460	1,930	[a]1,210	1,150	1,100	1,100	1,100
14	1,120	1,120	1,210	1,460	1,530	1,460	1,850	[a]1,210	1,150	1,100	1,100	1,100
15	1,120	1,120	1,210	1,460	1,530	1,460	1,770	[a]1,210	1,150	1,100	1,100	1,100
16	1,120	1,120	1,210	1,460	1,530	1,530	1,610	[a]1,210	1,100	1,100	1,100	1,100
17	1,120	1,120	1,210	1,460	1,530	1,610	1,530	1,210	1,100	1,100	1,100	1,100
18	1,120	1,120	1,210	1,530	1,580	1,960	1,460	1,210	1,100	1,100	1,100	1,100
19	1,120	1,120	1,210	1,530	1,530	2,180	1,460	1,210	1,100	1,100	1,100	1,100
20	1,120	1,120	1,210	1,530	1,530	2,360	1,390	1,210	1,100	1,100	1,100	1,100
21	1,120	1,120	1,210	1,530	1,460	2,450	1,390	1,210	1,100	1,100	1,150	1,100
22	1,120	1,120	1,270	1,530	1,460	2,450	1,390	1,210	1,100	1,100	1,150	1,100
23	1,120	1,120	1,270	1,530	1,530	2,630	1,390	1,210	1,100	1,100	1,150	1,100
24	1,120	1,120	1,270	1,460	1,460	2,900	1,390	1,210	1,100	1,100	1,150	1,100
25	1,120	1,120	1,270	1,460	1,460	3,300	1,330	1,210	1,100	1,100	1,150	1,100
26	1,120	1,120	1,270	1,460	1,460	3,200	1,330	1,210	1,100	1,100	1,100	1,100
27	1,120	1,120	1,270	1,460	1,460	3,600	1,330	1,210	1,125	1,100	1,100	1,100
28	1,120	1,120	1,330	1,460	1,460	2,820	1,330	1,210	1,100	1,100	1,100	1,100
29	1,120	1,210	1,460	1,460	.....	2,630	1,270	1,210	1,100	1,100	1,100	1,100
30	1,120	1,210	1,460	1,460	.....	2,720	1,270	1,210	1,100	1,100	1,100	1,100
31	1,120	.....	1,460	1,460	.....	2,900	.....	1,210	.....	1,100	1,100	.....

[a] Interpolated.

Monthly discharge of Crooked River near Culver, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,120	1,120	1,120	68,900
November	1,210	1,120	1,130	67,200
December	1,460	1,210	1,250	76,900
January	1,530	1,330	1,440	88,500
February	2,010	1,330	1,530	85,000
March	3,300	1,390	2,020	124,000
April	2,900	1,270	1,760	105,000
May	1,270	1,210	1,210	74,400
June	1,210	1,100	1,130	67,200
July	1,100	1,100	1,100	67,600
August	1,150	1,100	1,110	68,200
September	1,100	1,100	1,100	65,500
The year	3,300	1,100	1,320	958,000

OCHOCO CREEK ABOVE MILL CREEK, NEAR PRINEVILLE, OREG.

LOCATION.—In SW. ¼ sec. 36, T. 14 S., R. 17 E., on Dobb's ranch, 1½ miles above Mill Creek and 12 miles east of Prineville, Crook County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 8, 1917, to September 30, 1918, at present location. November 1, 1908, to April 30, 1910; November 23, 1914, to November 22, 1917, at Elliott ranch station near the Ochoco project dam site and below Mill Creek.

GAGE.—Stevens eight-day water-stage recorder on right bank referred to vertical staff braced to gage house; inspected by H. G. Kennard, water master.

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DISCHARGE MEASUREMENTS.—Made from cable 75 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel. Control is gravel riffle just below cable and probably shifts at high stages. Banks of earth.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.58 feet at 5 a. m. March 26 (discharge, 235 second-feet); minimum stage from water-stage recorder, 0.43 foot during September, exact time not known (discharge, 0.8 second-foot).

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—Many small private ditches divert water for a distance of about 30 miles above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting recorder graph, except for periods when recorder was not operating, for which it was ascertained by comparison with flow of Squaw, Tumalo, and McKay creeks. Records good.

Discharge measurements of Ochoco Creek above Mill Creek, near Prineville, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 8	H. G. Kennard [a]	0.87	8.2	Mar. 21	Kennard and Reineking [b]	2.02	123
Feb. 9	do	1.58	59				
Mar. 7	do	1.31	34.7	Apr. 19	Henshaw and Reineking	1.62	70
11	do	1.44	45.7	May 17	H. G. Kennard	1.24	30.2

[a] Water master. [b] Engineer, Ochoco Irrigation District.

Daily discharge, in second-feet, of Ochoco Creek above Mill Creek, near Prineville, Oreg., for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		30	40	39	172	29		8.0	2.8	0.9
2		28	42	45	154	31		7.6	2.8	.9
3		28	37	58	128	28		7.6	2.8	1.0
4	10	36	36	51	120	30	10	6.4	2.6	1.0
5		34	40	36	112	31		5.0	2.6	1.0
6		33	62	48	104	31		4.1		1.1
7			79	50	104	28	12	3.3		1.1
8	8		64	49	104	25	8.0	4.3		1.2
9			62	46	112	25	8.0	4.8	2.2	1.3
10		35	63	45	112	25	7.6	3.8		1.1
11			63	48	104	22	6.0	4.6		1.1
12			64	49	97	24	6.4	3.1	1.7	1.1
13	8	53	58	44	97	22	7.6	2.8	1.6	1.2
14		52	54	44	90	24	5.8	2.6	1.5	1.2
15		48	44	58	83	41	6.0	2.6	1.7	1.2
16		46	47	69	76	48	6.0	2.6	1.7	.9
17		58	[a] 42	87	74	35	8.0		1.7	.9
18		66	[a] 40	120	68	30	7.6		1.7	
19		63	[a] 40	120	62	33	5.3	2.2	1.8	
20		48	[a] 33	120	51	29	4.6		2.1	
21			[a] 35	120	51	25	5.8		1.5	
22		55	[a] 42	145	50	23	5.3	1.7	1.4	
23	30		44	163	46	20	4.8	4.1	1.3	
24			36	200	47	15	5.5	4.1	1.3	1.0
25		65	34	210	50	14	7.6	3.6	1.3	
26		62	38	210	41	14	7.2	3.4	1.1	
27		54	34	190	34	12	8.4	3.4	1.1	
28		50	31	163	31	12	8.4	3.1	1.1	
29	43	47	.....	172	29	10	7.2	2.8	1.0	
[illegible]	39	40	.....	190	28	9	7.6	2.8	.9	
[illegible]	35	36	.....	190	.....	9	.....	2.8	.9	.....

[illegible]d.

[illegible]ed figures show estimated mean discharge for periods indicated.

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Monthly discharge of Ochoco Creek above Mill Creek, near Prineville, Oreg., for the year year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October			[a] 2.5	154
November			[a] 5.0	298
December			18.6	1,140
January	66	28	45.4	2,790
February	79	31	46.6	2,590
March	210	36	103	6,330
April	172	28	81.0	4,820
May	48	9	24.3	1,490
June		4.6	7.56	450
July	8.0	1.7	3.74	230
August	2.8	.9	1.78	109
September	1.3	.9	1.04	62
The year	210	.9	28.2	20,500

[a] Estimated from records at Elliott ranch.

MILL CREEK NEAR PRINEVILLE, OREG.

LOCATION.—In SE. ¼ sec. 22, T. 14 S., R. 17 E., on Dill ranch, 1 mile above mouth and 10 miles east of Prineville, Crook County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 8, 1917, to July 4, 1918, at present location; March 14 to September 5, 1916, at old station (see under "Gage"). Station temporarily discontinued July 4; stream practically dry.

GAGE.—Stevens eight-day recorder on left bank referred to vertical staff braced to gage house; inspected by watermaster. Gage used in 1916 was vertical staff about 1 mile above.

DISCHARGE MEASUREMENTS.—Made from foot log at gage or by wading.

CHANNEL AND CONTROL.—Bed and control composed of gravel; slightly shifting. Banks of earth.

EXTREMES OF DISCHARGE.—Maximum stage for period from water-stage recorder, 2.15 feet at 6 a. m. March 26 (discharge, 110 second-feet); stream dry in summer owing to diversions above.

1916 and 1918: Maximum stage, 3.0 feet at 7 a. m. March 20, 1916 (discharge, 184 second-feet).

DIVERSIONS.—Many small ditches above station. Two diverted water around gage during year, probably only a few hundred acre-feet.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined above 4 second-feet. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph, except for periods indicated in footnote to table of daily discharge. Records good.

Discharge measurements of Mill Creek near Prineville, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 9	H. G. Kennard [a]	1.38	34.3	Apr. 5	H. G. Kennard [a]	1.67	63
27	do	1.14	20.2	19	Henshaw and Kennard	1.48	45
Mar. 14	do	1.31	32.0	19	do	1.48	45.6
21	do	1.77	72	May 17	H. G. Kennard	1.14	17.9

[a] Water master.

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Daily discharge, in second-feet, of Mill Creek near Prineville, Oreg., for the year ending Sept. 30, 1918.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May
1			24	24	85	29	16			25	40	52	26
2			23	29	80	27	17			22	56	50	19
3			20	34	70	20	18			20	80	46	19
4			17	34	65	17	19			20	85	44	17
5			20	27	63	18	20		30	13	90	40	17
6			29	32	60	19	21			15	90	41	16
7		15	48	35	60	17	22			22	90	42	14
8			42	32	60	17	23	15		22	90	37	15
9			37	29	60	17	24			20	95	37	16
10			36	29	60	16	25		40	17	95	37	
11			36	29	58	14	26			38	21	95	36	
12			30	30	60	10	27			33	20	90	36	19
13		36	35	29	60	14	28			30	18	80	33	
14		30	34	30	58	18	29	32		29		75	29	
15			15	32	55	22	30	25		26		80	29	
							31			16		85		4.6

NOTE.—Braced figures show estimated mean discharge for periods indicated. From Mar. 17 to 24 and May 12 to 16, discharge estimated from maximum and minimum stages indicated by recorder.

Monthly discharge of Mill Creek near Prineville, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December		0	7.5	461
January			24.5	1,510
February	48	13	25.0	1,290
March	95	24	57.1	3,510
April	85	29	51.4	3,060
May	29	4.6	16.1	990
June			[a] 1.3	77
July		0	[a] .1	6
The period				11,000

[a] Estimated.

NOTE.—Stream dry during August and September.

McKAY CREEK NEAR PRINEVILLE, OREG.

LOCATION.—In SW. ¼ sec. 4, T. 14 S., R. 16 E., 1,000 feet east of McKay Creek road and 6 miles north of Prineville, Crook County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January to June 30, 1918, at present location; February 25 1915, to June 21, 1916, at old location (see under "Gage").

GAGE.—Stevens eight-day water-stage recorder on left bank, inspected by H. G. Kennard, watermaster. Present gage is about 1½ miles above old station.

DISCHARGE MEASUREMENTS.—Made from private bridge 150 feet above gage or by wading near gage.

CHANNEL AND CONTROL.—Bed composed of gravel. Gravel riffle 100 feet below gage acts as control; shifts slightly. Banks of earth.

EXTREMES OF DISCHARGE.—Maximum stage during period from water-stage recorder, 2.07 feet at 6 a. m. March 25 (discharge, 130 second-feet); stream dry prior to January and subsequent to June.

1915–1916, 1918: Maximum stage recorded, 2.5 feet on former staff gage March 20, 1916 (discharge, 202 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice during period of record.

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Diversions.—Five small ditches divert water above the gage to irrigate about 1,000 acres.

Regulation.—None.

Accuracy.—Stage-discharge relation practically permanent. Rating curve fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting recorder graph, except for periods indicated in footnote to table of daily discharge. Records good.

Discharge measurements of McKay Creek near Prineville, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 5	H. G. Kennard [a]	1.20	19.0	Mar. 31	H. G. Kennard [a]	1.61	68
Mar. 1	do	1.24	23.1	Apr. 19	Henshaw and Kennard	1.03	14.9
24	do	1.90	105				

[a] Water master.

Daily discharge, in second-feet, of McKay Creek near Prineville, Oreg., for the year ending Sept. 30, 1918.

Day.	Jan.	Feb.	Mar.	Apr.	May.
1		18	26	57	.....
2		21	33	46	8.2
3		21	43	39	.....
4		21	40	34	.....
5		22	29	30	.....
6		36	28	27	.....
7		61	29	25	.....
8		48	28	24	.....
9	15	42	27	23	2.5
10		42	26	24	.....
11		41	27	[a] 21	.....
12		40	27	[a] 18	.....
13		36	25	16	.....
14		33	24		
15		27	27		11
16		33	32	15	.....
17	30	31	42		.....
18	13	29	68		
19	28	23	71	14	.....
20	62	21	77	13	.....
21	72	22	77	14	.....
22	93	21	89	15	9
23	102	25	[a] 97	[a] 12	.....
24	105	21	112	[a] 10	.....
25	100	19	128	8.2	.....
26	84	23	112	6.0	.....
27	70	21	89	4.2	.....
28	105	20	71		
29	50	.....	70	6.0	4.6
30	21	.....	75		
31	16	.....	67	.....	.....

[a] Interpolated.

Note.—Braced figures show estimated mean discharge for periods indicated. Stream dry prior to Jan. 1 and after June 30; monthly mean estimated for June.

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Monthly discharge of McKay Creek near Prineville, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
January	105	.....	38.4	2,360
February	61	18	29.4	1,630
March	128	24	55.4	3,410
April	57	.....	19.1	1,140
May	.....	.....	7.06	434
June	.....	.....	* 2.00	119
The year	.....	.....	.....	9,090

* Estimated.

NOTE.—Stream practically dry Oct. 1 to Dec. 31 and July 1 to Sept. 30.

LAKE CREEK NEAR SISTERS, OREG.

LOCATION.—In SE. ¼ sec. 24, T. 13 S., R. 8 E., a quarter of a mile below outlet of Suttle Lake, 6 miles from mouth of creek, and 15 miles northwest of Sisters, Jefferson County.

DRAINAGE AREA.—20.5 square miles.

RECORDS AVAILABLE.—April 7, 1915, to September 30, 1918; occasional readings, May to November, 1911; March to September, 1912; May to October, 1913.

GAGE.—Stevens continuous water-stage recorder on left bank beginning October 16; vertical staff used in 1917. Gage about 20 feet above a 15-foot weir read April 7, 1915, to April 30, 1916. Gage in natural channel, near site of weir, used 1911 to 1913. Inspected by Harry Heising and William Heathman.

CHANNEL AND CONTROL.—Heavy gravel and boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.24 feet at 7 a. m. December 30 (discharge, 247 second-feet); minimum stage recorded, 0.55 foot October 16 and 17 (discharge, 32 second-feet).

1911–1913; 1915–1918: Maximum stage recorded same as for 1918; minimum stage recorded, 0.31 foot October 18, 1917 (discharge, 20 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None above station; only one small ditch diverts from Lake Creek.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder rather unsatisfactory during period October 16 to July 19. Staff gage read once daily to hundredths October 1 to 16 and July 21 to September 30. Daily discharge ascertained October 16 to July 19, by applying to rating table the mean daily gage height obtained by inspecting the recorder graph, except for periods when recorder was not operating, for which it was ascertained by estimation and interpolation using maximum and minimum points from recorder sheet as a basis; October 1 to 16 and July 21 to September 30, by applying to rating table the daily gage reading. Records good.

Discharge measurements of Lake Creek near Sisters, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 11	C. L. Batchelder	0.57	34.2	June 7	H. G. Kennard	0.80	50
Nov. 16	R. C. Briggs	.57	33.3	26	R. C. Briggs	.70	40.4
Feb. 14	....do	1.16	88	July 18	....do	.63	37.7
Apr. 17	F. F. Henshaw	1.01	70				

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Daily discharge, in second-feet, of Lake Creek near Sisters, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	36	33	61	185		61		69	53	40	36	34
2	36	33	55	158		60		69	52	40	36	34
3	36	34	53	143		59		69	51	41	36	34
4	36	34	50	140	85	61		70	50	40	36	34
5	36	35	48	a137		59		72	50	39	36	34
6	36	35	48	a134		59		72		39	36	34
7	a36	35	44	a131	85	58		73		39	35	34
8	a35	34	44	a127	84	58		74		39	35	32
9	a34	34	41	a124		60	65	75		40	35	32
10	a33	34	40	a121		59		75		40	35	32
11	33	34	38	118	85	60		74		40	35	32
12	33	34	40	a122		59		72		40	35	32
13	33	34	44	a126	85	58		70		39	35	34
14	34	34	44	129	86	56		70		38	35	34
15	a33	34	44	a125	83			70		38	35	34
16	32	33	47	a121	82			69	50	38	35	34
17	32	33	58	a117	82		68	68		38	35	34
18	32	33	66	a113	78		68			38	35	34
19	33	34	96	a110	76		66			37	35	34
20	33	34	150	a106	74		66			38	35	34
21	34	34	195	a102	72		66			38	35	34
22	34	35	193	a98	70	60	65			38	35	34
23	34	35	198	a94	70		65			38	34	35
24	34	34	209	90	69		66	70		38	34	35
25	32	34	214	90	65		67			38	34	35
26	32	34	201	90	64		68		42	38	34	35
27	32	34	196	90	63		69		41	38	34	35
28	32	39	217	84	62		70		41	38	34	35
29	32	48	242	81	.....		70		40	38	34	35
30	32	64	244	79	.....		69		40	36	34	35
31	32	.....	222	75	.....		.....		.....	36	34	.....

a Interpolated.

NOTE.—Braced figures show estimated mean discharge for periods indicated.

Monthly discharge of Lake Creek near Sisters, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	36	32	33.6	2,070
November	64	33	35.6	2,120
December	244	38	111	6,820
January	185	75	115	7,070
February	.....	62	78.7	4,370
March	.....	.....	59.6	3,660
April	.....	.....	66.1	3,930
May	.....	.....	70.7	4,350
June	.....	.....	48.7	2,900
July	41	36	38.5	2,370
August	36	34	34.9	2,150
September	35	32	33.9	2,020
The year	244	32	60.5	43,800

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WARM SPRINGS RIVER NEAR WARM SPRING, OREG.

LOCATION.—In NE. ¼ sec. 19, T. 8 S., R. 13 E., in Wasco County, at bridge on road between Warm Spring and Simnasho, 9 miles from Warm Spring and 15 miles from Simnasho.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 29, 1911, to September 30, 1918 (fragmentary period to 1914).

GAGE.—Stevens water-stage recorder since July 1, 1914; fastened to downstream side of right abutment; inspected by Jerry Brunoe and Willie Palmer. Vertical staff spiked to upstream side of right abutment of old bridge, July 29, 1911, to July 1, 1914.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or by wading.

CHANNEL AND CONTROL.—Control composed of gravel and small boulders, about 100 yards below bridge; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.27 feet at 8 p. m. December 28 (discharge, 2,130 second-feet); minimum stage recorded, 0.87 foot September 13 (discharge, 228 second-feet).

1911–1918: Maximum stage recorded 4.0 feet at 10 p. m. March 9, 1916 (discharge, 2,930 second-feet); minimum stage recorded, 0.73 foot January 15, 1915 (discharge, 192 second-feet).

ICE.—River probably never freezes, as there are hot springs just above bridge.

DIVERSIONS.—None.

REGULATIONS.—None.

ACCURACY.—Stage-discharge relation changed slightly during March. Two rating curves used, both well defined; old rating applicable to April 7, and new rating used thereafter. Gage-height record during March, April, and May fragmentary owing to lack of attention to water-stage recorder. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph, except for periods when recorder was not operating, for which it was ascertained by comparison with flow of White River and Clear Creek. Records good.

Discharge measurements of Warm Springs River near Warm Spring, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 17	R. C. Briggs	1.60	701	June 27	R. C. Briggs	1.01	286
Apr. 18	F. F. Henshaw	1.38	468	Sept. 27	C. L. Batchelder	.93	229
May 28	C. L. Batchelder	1.18	378				

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Daily discharge, in second-feet, of Warm Springs River near Warm Spring, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	a 305	288	534	1,100	612	594	.....	496	365	285	298	285
2	a 305	288	410	990	665	564	.....	502	360	285	303	276
3	305	288	370	890	644	528	.....	508	355	280	312	272
4	305	288	360	1,240	644	.....	.....	514	350	285	312	267
5	301	288	350	975	1,240	.....	.....	526	345	276	316	262
6	301	288	350	850	1,430	.....	.....	508	335	276	321	258
7	301	288	346	906	1,580	.....	502	466	326	272	330	254
8	296	288	336	842	1,240	.....	.....	442	321	272	330	244
9	296	288	332	770	1,120	.....	.....	436	316	272	330	244
10	292	288	323	700	1,020	.....	.....	436	321	272	330	240
11		288	328	693	948	.....	.....	.....	321	267	330	236
12		288	332	1,340	882	.....	.....	.....	316	267	330	232
13		288	399	1,180	834	.....	.....	.....	312	262	326	228
14	290	288	474	1,380	786	.....	526	.....	308	262	321	244
15		288	522	1,290	728	.....	.....	.....	303	258	316	272
16		288	456	1,140	721	.....	.....	.....	303	267	321	262
17		288	588	1,110	700	.....	.....	.....	298	267	321	249
18	288	288	1,290	1,380	679	.....	478	.....	294	262	316	249
19	288	288	1,890	1,140	644	.....	490	.....	290	262	312	249
20	288	288	1,380	984	600	.....	502	.....	290	267	312	254
21	288	288	1,200	930	570	.....	520	.....	290	262	312	254
22	288	288	1,000	858	546	.....	508	.....	290	272	312	
23	288	288	1,180	826	576	.....	520	.....	294	290	312	
24	288	288	1,120	770	564	.....	526	.....	308	294	312	254
25	288	288	890	993	540	.....	550	.....	298	290	308	
26	288	292	1,200	906	582	.....	532	.....	294	285	308	
27	288	292	1,930	850	a 570	.....	508	.....	290	285	308	254
28	288	305	2,080	786	a 550	.....	490	375	290	285	294	258
29	288	390	1,980	786	.....	.....	490	370	285	285	290	258
30	288	721	1,620	728	.....	.....	490	365	285	290	290	267
31	288	.....	1,340	582	.....	.....	.....	365	.....	294	285	.....

a Interpolated.

NOTE.—Braced figures show estimated mean discharge for period indicated.

Monthly discharge of Warm Springs River near Warm Spring, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	305	288	293	18,000
November	721	288	307	18,300
December	2,080	323	882	54,200
January	1,380	582	963	59,200
February	1,580	546	793	44,000
March	.....	.....	a 500	30,700
April	.....	.....	a 520	30,900
May	526	.....	a 420	25,800
June	365	285	312	18,600
July	294	258	276	17,000
August	330	285	313	19,200
September	285	228	255	15,200
The year	2,080	228	485	351,000

a Estimated.

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WHITE RIVER NEAR TYGH VALLEY, OREG.

LOCATION.—In SW. ¼ sec. 10, T. 4 S., R. 13 E., 1 mile south of Tygh Valley, Wasco County, 1 mile above mouth of Tygh Creek, and 4 miles above Tygh Valley plant of Pacific Power & Light Co. at fall of White River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 18, 1911, to December 10, 1918, when station was discontinued.

GAGE.—Vertical staff on lower corner of left pier of highway bridge; read by Mrs. Bessie Nickerson.

DISCHARGE MEASUREMENTS.—Made from downstream side of highway bridge.

CHANNEL AND CONTROL.—Gravel and sand; slightly shifting. White River carries a large amount of glacial sediment at times.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 4.90 feet at 8 a. m. December 19 (discharge, 3,400 second-feet); minimum stage recorded, 0.58 foot November 26 and 27, 1917 (discharge, 110 second-feet).

1911–1918: Maximum stage recorded, 5.3 feet January 9, 1912 (probably ice-affected); maximum open-water stage recorded, December 19, 1917 (see preceding paragraph); minimum stage recorded, 0.30 foot September 7, 20, 24, and 27, 1915 (discharge, 82 second-feet).

ICE.—Stage-discharge relation not affected by ice during period.

DIVERSIONS.—The Wapinitia Irrigation Co. began diverting a small quantity of water in the spring of 1917 from Clear Creek, a tributary of White River. This water is used to irrigate land lying south of White River known as Juniper Flats.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water of December and January. Two rating curves used, both well defined; old rating applicable to December 18 and new rating used thereafter. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of White River, near Tygh Valley, Oreg., during the period Oct. 1, 1917, to Dec. 10, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	C. L. Batchelder	0.60	115	June 26	R. C. Briggs	0.75	180
Apr. 10	C. E. Stricklin [a]	1.35	453	Aug. 5	C. E. Stricklin	.60	147
24	do	1.55	577	Oct. 12	C. L. Batchelder	.55	124

[a] Assistant to State engineer.

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Daily discharge, in second-feet, of White River near Tygh Valley, Oreg., for the period Oct. 1, 1917, to Dec. 10, 1918.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	139	115	322	.....	480	330	175	145	130	130	145	160
2	139	115	215	.....	480	285	169	154	130	130	145	160
3	130	124	145	.....	508	285	169	145	130	139	139	160
4	130	124	173	.....	562	285	169	145	124	139	139	160
5	130	124	180	.....	508	330	169	145	124	145	136	192
6	130	130	180	.....	480	355	169	145	121	145	130	210
7	130	130	162	.....	455	355	175	145	115	154	130	210
8	130	115	162	.....	430	355	169	145	115	130	130	210
9	130	115	162	.....	430	330	169	145	124	124	130	210
10	130	115	162	455	405	330	169	145	124	115	130	192
11	130	115	145	455	380	308	169	145	115	130	160	.....
12	124	130	255	455	380	308	169	145	115	130	160	.....
13	124	180	880	455	380	308	169	145	121	139	160	.....
14	124	173	950	405	405	285	160	145	480	139	160	.....
15	124	130	710	405	405	265	160	145	175	145	245	.....
16	124	124	532	405	380	245	169	139	145	285	220	.....
17	115	115	1,160	405	380	245	169	139	145	175	203	.....
18	115	115	2,010	380	380	245	175	139	145	145	186	.....
19	115	115	2,400	380	380	245	169	139	145	145	186	.....
20	115	115	1,780	430	380	220	169	130	145	139	175	.....
21	124	115	1,130	480	355	220	160	130	139	139	175	.....
22	124	115	1,440	508	355	210	154	130	139	130	169	.....
23	124	115	1,280	508	355	210	175	130	130	130	160	.....
24	124	115	1,000	535	330	210	160	136	130	136	169	.....
25	130	115	1,060	480	330	210	160	139	130	139	175	.....
26	130	110	1,130	480	330	200	160	139	130	139	175	.....
27	124	110	1,520	480	308	200	154	139	115	145	175	.....
28	124	130	2,230	455	308	192	145	130	115	245	175	.....
29	115	180	2,320	455	308	182	139	130	115	203	169	.....
30	115	560	1,870	456	330	175	145	130	115	175	154	.....
31	115	.....	1,440	.....	330	.....	145	130	.....	166	.....	.....

Monthly discharge of White River near Tygh Valley, Oreg., for the period Oct. 1, 1917, to Dec. 10, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	139	115	125	7,600
November	560	110	139	8,270
December	3,400	145	973	59,800
April 10-30	535	380	451	18,800
May	562	308	394	24,200
June	355	175	264	15,700
July	175	139	164	10,100
August	154	130	140	8,610
September	480	115	141	8,300
October	285	115	151	9,280
November	245	120	164	9,760
December 1-10	210	160	186	3,600

WHITE RIVER BELOW TYGH VALLEY, OREG.

LOCATION.—In NW. ¼ sec. 8, T. 4 S., R. 14 E., just below Pacific Power & Light Co.'s plant and 4½ miles below Tygh Valley, Wasco County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 20, 1917, to September 30, 1918.

GAGE.—Stevens eight-day water-stage recorder on left bank, with vertical gage inside well; inspected by M. F. Coberth.

DISCHARGE MEASUREMENTS.—Made from cable a quarter of a mile below gage or by wading.

CHANNEL AND CONTROL.—Control of rock overlain with sand deposits; somewhat shifting.

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Extremes of discharge.—Maximum stage from water-stage recorder, 8.24 feet at 1 a. m. December 19 (discharge, 5,940 second-feet); minimum stage, 0.50 foot at 5 p. m. November 26 (discharge, 105 second-feet).

Ice.—Stage-discharge relation not seriously affected by ice.

Diversions.—Numerous small irrigation ditches divert above this station.

Regulation.—Operation of power plant above regulates flow to some extent.

Accuracy.—Stage-discharge relation changed on December 19. Fairly well defined rating curve used after December 19; same rating used for shifting-control method November 20 to December 18. Operation of recorder satisfactory except for gap January 5 to February 3 when well was filled with sand. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting recorder graph, or at times of considerable fluctuation by subdividing days. Records good.

Discharge measurements of White River below Tygh Valley, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 11	C. L. Batchelder	1.00	142	May 27	C. L. Batchelder	1.82	402
Feb. 6	R. C. Briggs	3.24	1,130	June 28	R. C. Briggs	1.35	226
Apr. 10	C. E. Stricklin [a]	2.41	595	July 9	C. E. Stricklin	1.13	182
25	do	2.54	694	Aug. 25	do	1.00	163
May 22	do	1.96	452				

[a] Assistant to State engineer.

Daily discharge, in second-feet, of White River below Tygh Valley, Oreg., for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		350	1,920		515	690	690	370	220	184	151
2		245	1,660	700	540	640	715	370	214	187	156
3		212	1,520		540	590	740	350	206	182	146
4		208	1,840	860	540	565	800	350	204	176	140
5		206		1,100	530	565	770	370	202	167	138
6		268		1,370	520	540	715	390	202	171	136
7		198		1,600	510	540	665	390	198	167	141
8		187		1,230	500	540	640	390	196	169	141
9		185		1,100	490	565	615	390	196	169	143
10	147	189		1,100	480	640	590	390	202	167	149
11		184		1,040	470	665	540	390	202	167	143
12		295		950	430	665	540	370	200	166	138
13		1,040		890	390	640	540	350	194	166	144
14		1,230		830	370	565	590	330	191	162	410
15		860		770	370	540	565	312	193	162	238
16		740		770	370	540	565	295	198	162	189
17		1,600	982	830	370	540	515	295	196	162	171
18		3,600		770	410	490	490	280	200	169	164
19		4,980		690	410	490	490	280	196	160	157
20	136	3,000		615	410	540	470	265	187	160	156
21	136	2,060		590	410	640	450	265	176	159	152
22	135	2,080		565	430	770	450	258	189	160	149
23	133	2,000		590	470	740	430	258	198	167	146
24	132	1,600		615	515	770	410	252	194	160	144
25	132	1,230		590	640	715	390	240	198	162	143
26	126	1,840		590	590	640	370	240	193	157	144
27	130	2,700		540	590	640	370	233	187	151	145
28	166	3,900		515	565	640	370	229	176	146	146
29	216	3,800		.....	565	640	370	227	180	149	144
30	665	2,900		.....	640	665	390	222	187	152	142
31	.....	2,340		.....	715	.....	390	.....	187	154	.....

Note.—Braced figures show estimated mean discharge for periods indicated. Discharge estimated Oct. 1–31, 146 second-feet, and Nov. 1–19 by adding estimated flow of Tygh Creek to observed flow of White River near Tygh Valley; Jan. 5 to Feb. 3 from comparison of flow of Sandy, Hood, and White Salmon rivers. Discharge interpolated Mar. 5–10, Aug. 11–12, Sept. 26, 27, 29, 30.

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Monthly discharge of White River below Tygh Valley, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October			145	8,920
November		126	163	9,700
December	4,980	184	1,490	91,600
January			1,080	66,400
February	1,670	515	828	46,000
March	715	370	493	30,300
April	770	490	614	36,500
May	800	370	537	33,000
June	390	222	312	18,600
July	220	176	195	12,000
August	187	146	164	10,100
September	410	138	160	9,520
The year	4,980	126	515	373,000

CLEAR CREEK ABOVE INTAKE, NEAR WAPINITIA, OREG.

LOCATION.—In SW. ¼ sec. 10, T. 5 S., R. 9 E., 300 feet above intake of Wapinitia Irrigation Co.'s canal, 4 miles below outlet of Clear Lake, and 22 miles west of Wapinitia, Wasco County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 16 to September 20, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by C. E. Stricklin.

DISCHARGE MEASUREMENTS.—Made by wading near intake of canal.

CHANNEL AND CONTROL.—Sand, gravel, and small boulders; may shift slightly.

EXTREMES OF DISCHARGE.—Maximum stage during period from water-stage recorder, 1.70 feet at 5 p. m., May 16 (discharge, 44 second-feet); minimum stage from water-stage recorder, 1.28 feet August 31, September 3 to 8, and 11 to 12 (discharge, 5.0 second-feet).

DIVERSIONS.—Wapinitia Irrigation Co.'s canal diverts water just below station. No diversion above.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined. Gage record is incomplete and no estimates have been made during gaps, except a three-day interpolation in August. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting recorder graph. Records good.

Discharge measurements of Clear Creek above intake, near Wapinitia, Oreg., during the year ending Sept. 30, 1918.

[Made by C. E. Stricklin.[a]]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 4	1.50	23.1
July 8	1.36	10.6
Aug. 27	1.30	6.5

[a] Assistant to State engineer.

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Daily discharge, in second-feet, of Clear Creek above intake near Wapinitia, Oreg., for the year ending Sept. 30, 1918.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1		26		8.1	5.5	16	44		9.5	6.0	6.7
2		24		8.1	5.5	17	42		8.8	6.0	5.5
3		23		8.1	5.0	18	41		8.1	6.0	5.5
4		23		7.4	5.0	19	41		7.4	6.0	5.5
5		24		7.4	5.0	20	41		7.4	6.0	5.5
6		23		6.7	5.0	21	40		6.7	6.0	
7		23		6.7	5.0	22	37		6.7	6.0	
8		22	10.0	6.7	5.0	23	36		7.4	6.0	
9			9.5	6.7	5.5	24	35		7.4	[a] 6.0	
10			10.0	6.7	5.5	25	34		8.1	[a] 6.0	
11			9.5	6.7	5.0	26	32		8.1	[a] 6.0	
12			10.0	6.0	5.0	27	31		7.4	6.0	
13			9.5	6.0	5.5	28	29		8.1	5.5	
14			9.5	6.0	6.0	29	29		8.1	5.5	
15			8.8	6.0	8.8	30	27		8.8	5.5	
						31	27		8.8	5.0	

[a] Interpolated.

Monthly discharge of Clear Creek above intake near Wapinitia, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 16–31	44	27	35.4	1,120
June 1–8	25	22	23.4	371
July 8–31	10	6.7	8.48	404
August	8.1	5.0	6.35	390
September 1–20	8.8	5.0	5.55	220

CLEAR CREEK AT OAK GROVE ROAD, NEAR WAPINITIA, OREG.

LOCATION.—In SW. ¼ sec. 8, T. 5 S., R. 10 E., where Oak Grove road crosses creek, 18 miles west of Wapinitia, Wasco County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 1, 1917, to August 26, 1918, when station was discontinued.

GAGE.—Vertical staff on left bank about 25 feet above highway bridge. Stevens continuous water-stage recorder referred to this staff gage from November to May 15; inspected by J. L. Maddren.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading at gage.

CHANNEL AND CONTROL.—Composed of gravel and sand; subject to shift. Banks of earth.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 2.03 feet at 9 p. m. December 19 (discharge, 226 second-feet); minimum stage recorded, 0.47 foot November 1 (discharge, 17 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—Wapinitia Irrigation Co.'s canal diverts water about 3 miles above station.

REGULATION.—None.

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ACCURACY.—Stage-discharge relation not permanent. Two fairly well defined rating curves used, applicable November 1 to January 12 and February 8 to August 26; indirect method for shifting control used January 13 to February 7. Operation of recorder fairly satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height obtained from inspecting recorder graph, or, after May 15, by applying the occasional daily gage readings. Records good November to May, fair June to August.

Discharge measurements of Clear Creek at Oak Grove road, near Wapinitia, Oreg., during the period Nov. 1, 1917, to Dec. 3, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	C. L. Batchelder	0.47	16.4	June 4	C. E. Stricklin [a]	0.62	31.5
Jan. 9	C. E. Stricklin [a]	1.38	120	July 16	do	.48	20.0
Apr. 11	do	.95	78	Dec. 3	F. F. Henshaw	.47	19.4
May 1	do	.85	63				

[a] Assistant to State engineer.

Daily discharge, in second-feet, of Clear Creek at Oak Grove road near Wapinitia, Oreg., for the year ending Sept. 30, 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	17		154	126	70	83	62			
2	18		146	116	67	81	64			
3	18		139	115	70	78	64			
4	18		162	138	70	76		33		
5	18		[a]154	146	62	75				
6	18		[a]146	186	62	73				19
7	18	30	[a]137	178	64	72				
8	18		[a]129	175	61	73				
9	18		121	166	[a]60	73	60			
10	18		115	157	60	75				20
11	18		112	146	[a]59	78				
12	19		139	137	58	78				
13	19		146	130	58	72				
14	19		146	119	56	60				
15	18	34	154	116	56	62				
16	19	33	146	112	56	66	55		20	
17	19	46	146	110	56	67				
18	19	102	162		56	67				
19	19	202	154		56	66				
20	19	194	146		56	66				
21	19	162	139		56	66				
22		154	133		62	66				
23		162	127	90	66	67				
24		139	127		66	67	40			
25		120	162		70	67				
26	18	132	146		72	66				19
27		170	139		72	64				
28		194	139		72	64				
29		202	146		75	62				
30	60	186	138		78	62			20	
31		170	121		81					

[a] Interpolated.

NOTE.—Braced figures show estimated mean discharge for periods indicated.

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Monthly discharge of Clear Creek at Oak Grove road, near Wapinitia, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November		17	19.7	1,170
December	202		91.0	5,600
January	162	112	141	8,670
February	186		120	6,660
March	81	55	63.9	3,930
April	83	60	69.7	4,150
May			a50.0	3,070
June			a28.0	1,670
July			a22.0	1,350
August			a19.0	1,170
September			a18.0	1,070
The period				38,300

a Estimated.

GATE CREEK NEAR WAMIC, OREG.

LOCATION.—In sec. 33, T. 4 S., R. 12 E., at Mulvany Bros.' sawmill, 2 miles below a possible reservoir site and 5 miles southwest of Wamic, Wasco County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 7, 1917, to September 30, 1918, when station was discontinued.

GAGE.—Vertical staff on left bank, about 600 feet below a wagon bridge; read by Myrtle Mulvany.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Control not well defined. Banks of earth overgrown with brush.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 3.3 feet January 3 and 15 (discharge, estimated from extension of rating curve, 122 second-feet). Minimum discharge probably occurred in August.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Three small ditches divert above station. Ordinarily water is not diverted in an appreciable quantity until June.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent until August 3, when a dam put in creek below gage caused backwater. Rating curve well defined below 20 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except December to February, for which period they are poor on account of poor definition of rating curve at high stages.

COOPERATION.—Records furnished by State engineer.

Discharge measurements of Gate Creek near Wamic, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	C. E. Stricklin a	0.58	1.61	May 2	C. E. Stricklin	1.21	10.8
Mar. 30	H. K. Donnelly a	1.54	22.5	June 6	do	.96	6.4
Apr. 12	C. E. Stricklin	1.40	14.9	Aug. 27	do	.98	.41

a Assistant to State engineer.

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Daily discharge, in second-feet, of Gate Creek near Wamic, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1		2.9	3.7	64	50	30	20	12	6.4	1.3
2		2.0	2.9	53	50	30	19	12	6.1	1.3
3		2.2	3.0	122	56	30	18	11	6.0	1.3
4	1.6	2.4	2.9	118	65	30	18	11	5.9	1.3
5		2.4	2.9	56	80	29	17	11	5.6	1.2
6		2.4	2.9	57	80	29	16	10	5.3	1.2
7	1.6	2.4	3.0	56	86	28	16	10	5.0	1.2
8	1.6	2.3	3.3	61	100	28	16	12	5.3	1.0
9	1.6	2.3	3.4	68	107	26	15	11	5.3	1.2
10	1.6	2.3	3.3	87	100	26	15	11	5.3	1.0
11	1.6	2.4	3.3	89	100	26	15	11	5.0	1.6
12	1.6	2.4	3.5	94	80	26	15	10	4.8	1.5
13	1.6	2.4	3.6	94	86	27	15	10	4.3	1.3
14	1.6	2.4	6.9	121	90	26	14	12	3.6	1.2
15	1.7	2.4	8.0	122	93	26	14	11	3.2	1.0
16	1.7	2.4	9.0	93	74	26	14	10	2.6	1.0
17	1.8	2.4	10	93	56	26	12	10	2.2	1.0
18	1.8	2.5	10	100	55	26	13	10	1.8	1.0
19	1.8	2.5	12	107	53	22	13	10	1.6	.8
20	1.7	2.5	12	93	53	20	12	9.6	1.6	.8
21	1.8	2.5	15	82	49	22	12	9.2	1.6	1.0
22	1.8	2.5	16	79	48	22	12	8.8	1.6	1.6
23	1.7	2.5	35	68	45	22	12	8.4	2.6	1.6
24	1.7	2.6	39	74	22	22	12	8.0	2.2	1.5
25	1.8	2.7	40	75	24	22	12	7.7	1.8	1.2
26	1.8	2.8	45	80	26	22	12	7.4	1.6	1.2
27	1.9	2.8	65	68	30	22	12	7.0	1.6	1.0
28	1.8	2.9	68	65	29	22	12	7.0	1.6	1.0
29	1.7	3.1	77	68	.....	22	12	6.7	1.5	1.0
30	1.8	3.3	68	71	.....	20	12	6.7	1.3	.8
31	2.0	.....	65	62	.....	20	.....	6.4	.....	.8

NOTE.—Braced figure shows estimated mean discharge for period indicated.

Monthly discharge of Gate Creek near Wamic, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2.0	1.6	1.70	105
November	3.3	2.0	2.49	148
December	77	2.9	20.7	1,270
January	122	53	81.9	5,040
February	107	22	63.8	3,540
March	30	20	25.0	1,540
April	20	12	14.2	845
May	12	6.4	9.61	591
June	6.4	1.3	3.48	207
July	1.6	.8	1.16	71
August	.....	.....	[a] .60	37
September	.....	.....	[a] 1.00	60
The year	122	.....	18.6	13,500

[a] Estimated.

TYGH CREEK AT TYGH VALLEY, OREG.

LOCATION.—In sec. 4, T. 4 S., R. 13 E., 1½ miles above mouth of creek and 100 yards west of Tygh Valley post office, Wasco County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 9 to October 31, 1913; May 13 to December 2, 1918; records fragmentary.

GAGE.—Vertical staff fastened to tree on right bank; read by Claude Hart. Prior to 1918 gage was at highway bridge a quarter of a mile below.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading near gage.

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CHANNEL AND CONTROL.—Bed and control composed of sand and gravel; shifting. Banks of earth.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 2.1 feet May 13 (discharge, 94 second-feet); minimum stage recorded, 1.54 feet August 31 (discharge, 15 second-feet).

1911–1918: Maximum stage recorded, 2.55 feet May 26, 1913 (discharge, 354 second-feet); minimum stage recorded, 0.80 foot August 31 to September 4, 1911 (discharge, 11 second-feet).

DIVERSIONS.—A considerable area irrigated above the station; practically no diversions below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curves used as follows: May 25 to August 5, well defined; August 6 to 31, shifting-control method used; October 12 to December 2, fairly well defined. Gage read once daily to hundredths. Daily discharge ascertained by applying daily gage height to rating table, and interpolating for days of no gage reading. Records good.

Discharge measurements of Tygh Creek at Tygh Valley, Oreg., during the period May 13 to Dec. 2, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 13	C. E. Stricklin [a]	2.10	92	July 31	C. E. Stricklin	1.60	20.2
25	do	1.97	69	Aug. 26	do	1.58	16.4
June 28	R. C. Briggs	1.75	33.1	Oct. 12	C. L. Batchelder	1.62	17.0

[a] Assistant to State engineer.

Daily discharge, in second-feet, of Tygh Creek at Tygh Valley, Oreg., for the period May 13 to Dec. 2, 1918.

Day.	May.	June.	July.	Aug.	Oct.	Nov.	Dec.
1		70	30	20		27	33
2		68	29	20		25	33
3		66	28	20		28	
4		64	28	20		30	
5		66	28	20		25	
6		70	27	19		27	
7		74	[a] 26	18		26	
8		70	26	18		25	
9		68	25	18		27	
10		66	25	18		28	
11		64	25	[a] 18		30	
12		63	25	18	17	35	
13	94	61	25	18	[a] 17	30	
14		61	[a] 25	18	17	33	
15		59	25	18	18	59	
16		52	25	17	21	56	
17		50	24	18	25	49	
18		49	24	[a] 18	35	43	
19		49	23	18	28	40	
20		46	23	18	25	40	
21		40	[a] 23	18	24	38	
22		40	23	18	25	38	
23		[a] 39	23	18	24	35	
24		38	22	18	22	35	
25	70	38	22	[a] 17	24	35	
26	66	36	22	16	59	35	
27	63	35	22	16	70	33	
28	61	34	[a] 22	16	59	33	
29	63	33	22	16	43	30	
30	66	32	21	15	30	30	
31	70		20	15	22		

[a] Interpolated.

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Monthly discharge of Tygh Creek at Tygh Valley, Oreg., for the period May 25 to Nov. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 25-31	70	61	65.6	911
June	74	32	53.4	3,180
July	30	20	24.5	1,510
August	20	15	17.8	1,090
October 12-31	70	17	30.2	1,200
November	59	25	34.2	2,040

FIFTEENMILE CREEK NEAR DUFUR, OREG.

LOCATION.—In NW. ¼ sec. 21, T. 2 S., R. 12 E., on road to Friend, 10 miles south of Dufur, Wasco County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1 to September 30, 1918.

GAGE.—Vertical staff on log abutment at left of creek; read by W. R. Ragsdale.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel bar and brush foundation of old dam 50 feet below gage; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.70 feet, January 2 (discharge, 113 second-feet); minimum stage recorded, 0.46 foot, August 28 (discharge, 0.6 second-foot).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—About 1,150 acres irrigated above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined. Gage read to hundredths once daily, except Sundays. Daily discharge ascertained by applying daily gage height to rating table and interpolating for days of no gage reading. Records good.

COOPERATION.—Field data furnished by State engineer.

Discharge measurements of Fifteenmile Creek near Dufur, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 12	C. E. Stricklin [a]	1.35	75.3	July 5	C. E. Stricklin	0.62	9.2
Mar. 29	H. K. Donnelly [a]	.90	32.4	27	do	.52	6.2
Apr. 9	C. E. Stricklin	.85	25.7				

[a] Assistant to State engineer.

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Daily discharge, in second-feet, of Fifteenmile Creek near Dufur, Oreg., for the year ending Sept. 30, 1918.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	[a] 125	54	36	36	36	31	10	7	5
2	113	60	38	36	36	[b] 31	10	7	5
3	102	[b] 54	[b] 38	35	40	31	10	6	5
4	109	48	38	33	46	31	[b] 10	[b] 6	4
5	102	50	36	33	[b] 45	31	10	7	4
6	[b] 102	80	36	33	44	36	17	6	4
7	102	91	36	33	44	38	[b] 14	6	4
8	95	80	36	33	44	40	10	6	5
9	91	76	35	33	44	[b] 40	10	6	6
10	80	[b] 71	[b] 33	32	40	40	10	5	6
11	89	66	31	32	40	38	10	[b] 5	6
12	76	60	31	33	[b] 38	36	10	5	5
13	[b] 74	60	31	31	36	35	[b] 10	5	4
14	72	58	31	[b] 31	[b] 37	33	10	5	40
15	70	52	31	31	38	31	10	7	24
16	70	50	31	31	38	[b] 31	9	5	7
17	70	[b] 48	[b] 31	31	40	31	7	6	7
18	72	46	31	31	40	33	7	[b] 6	7
19	70	46	31	31	[b] 39	31	7	5	6
20	[b] 67	40	31	31	38	31	7	6	4
21	64	40	31	[b] 31	38	23	[b] 8	6	5
22	60	[b] 40	33	31	36	21	8	6	5
23	60	40	33	33	31	[b] 20	9	6	6
24	60	[b] 39	[b] 34	33	31	18	8	5	6
25	60	38	35	33	29	21	11	[b] 5	5
26	58	36	36	33	[b] 28	17	10	4	5
27	[b] 57	36	36	33	28	21	7	4	6
28	56	36	35	[b] 33	28	17	[b] 6	4	5
29	56	.....	35	[b] 34	31	14	6	5	5
30	54	.....	35	[b] 35	[b] 31	10	5	5	5
31	50	.....	36	.....	31	.....	5	5	.....

[a] Estimated by comparison with flow of Ramsey Creek.
[b] Interpolated.

Monthly discharge of Fifteenmile Creek near Dufur, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
January	[a] 125	50	76.7	4,720
February	91	36	53.4	2,970
March	38	31	33.9	2,080
April	36	31	32.7	1,950
May	46	28	36.9	2,270
June	40	10	28.7	1,710
July	17	5	9.1	560
August	7	4	5.5	338
September	40	4	7.0	417
The period	.....	.....	.....	17,000

[a] Estimated.

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KLICKITAT RIVER BASIN.

KLICKITAT RIVER NEAR GLENWOOD, WASH.

LOCATION.—In NE. ¼ sec. 14, T. 7 N., R. 12 E., just below Dairy Creek, 2½ miles below southern boundary of Yakima Indian Reservation, 3 miles below Big Muddy Creek, and about 6 miles north of Glenwood, Klickitat County.

DRAINAGE AREA.—356 square miles.

RECORDS AVAILABLE.—December 16, 1910, to September 30, 1918, at present site; October 29, 1909, to December 15, 1910, at a point a mile above, in section 11.

GAGE.—Stevens continuous water-stage recorder referred to vertical staff on left bank; inspected by A. G. Hanson. Prior to July 19, 1910, several vertical staffs were used.

DISCHARGE MEASUREMENTS.—Made from cable just below gage.

CHANNEL AND CONTROL.—Heavy gravel; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 4.2 feet probably December 29 (recorder clock not running) (discharge, 6,20, second-feet); minimum stage from water-stage recorder, 0.20 foot at 7 p. m. December 7 (discharge, 330 second-feet).

1909-1918: Maximum stage recorded, 5.20 feet on original gage, November 24, 1909 (discharge, estimated by extension of rating curve, 6,250 second-feet). Minimum discharge, 285 second-feet at 11 a. m. Jan. 22, 1916 (gage height, 0.55 foot).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during December flood. Two rating curves used as follows: October 1 to December 17, well defined; January 9 to September 30, fairly well defined. The gage-height record was excellent except for breaks during November, December, and January, when recorder clock stopped. Daily discharge ascertained by applying to rating table mean daily gage heights obtained by inspecting recorder graph, or in time of considerable fluctuation by subdividing days, except for periods when recorder clock was not running, for which it was ascertained by comparison with flow of White Salmon River at Husum. Records good.

Discharge measurements of Klickitat River near Glenwood, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	A. G. Hanson	0.43	446	May 26	A. G. Hanson	0.93	1,140
Jan. 9	do	1.69	2,060	June 16	do	1.12	1,380
Mar. 29	do	.71	922	July 1	Hanson and Henshaw	.73	917
Apr. 18	do	.82	1,030	Sept. 15	A. G. Hanson	.26	646
May 5	do	1.56	1,860				

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Daily discharge, in second-feet, of Klickitat River near Glenwood, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.
1	494		416		784	758	1,120	1,670	1,490	947	734	605
2	494		386		812	752	1,070	1,800	1,310	956	698	600
3	494		380		920	752	1,020	2,000	1,260	912	650	585
4	488		380		1,110	746	1,000	2,070	1,260	888	640	580
5	488	425	360	2,600	1,200	728	992	1,930	1,430	888	630	585
6	488		365		1,310	710	992	1,740	1,670	888	635	575
7	488		340		1,260	728	992	1,670	1,860	880	640	580
8	506		360		1,180	728	1,030	1,610	1,930	880	620	590
9	506		365	2,070	1,130	716	1,190	1,550	1,860	880	615	600
10	494		355	1,860	1,160	710	1,260	1,430	2,000	864	674	600
11	482		360	1,860	1,120	722	1,310	1,370	1,930	833	630	595
12	464		386	1,930	1,090	704	1,370	1,370	1,860	805	630	600
13	476	400	608	1,740	1,050	692	1,260	1,490	1,930	805	630	625
14	476		877	1,670	1,010	686	1,200	1,930	1,800	819	625	674
15	476		676	1,550	983	686	1,140	1,930	1,490	920	605	630
16	458		913	1,490	983	698	1,110	1,740	1,370	1,010	590	600
17	440		1,450	1,490	947	716	1,080	1,670	1,370	1,020	575	590
18	434			1,610	912	770	1,050	1,550	1,310	1,020	575	580
19	434	398		1,430	888	740	1,080	1,430	1,260	920	580	605
20	440	404		1,370	840	734	1,170	1,370	1,260	791	585	600
21	446	422		1,310	752	734	1,310	1,260	1,310	746	600	570
22	440	410		1,260	805	880	1,550	1,200	1,370	752	615	560
23	440	404		1,260	848	880	1,670	1,200	1,310	777	656	540
24	440	398		1,260	812	920	1,670	1,190	1,260	752	674	540
25	440	392	3,100	1,200	a 802	992	1,610	1,160	1,150	734	866	549
26	434	380		1,180	a 791	983	1,490	1,130	1,080	722	680	550
27	428	375		1,140	a 780	965	1,430	1,120	1,070	704	615	550
28	428	380		1,120	770	938	1,490	1,120	1,010	710	600	565
29		386		1,090	.....	956	1,550	1,230	938	704	620	560
30	425	416		1,040	.....	1,050	1,670	1,550	938	740	620	560
31		.....		826	.....	1,130	.....	1,670	.....	728	615	.....

a Interpolated.

NOTE.—Braced figures show estimated mean discharge for periods indicated.

Monthly discharge of Klickitat River near Glenwood, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 356 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	506	425	461	1.29	1.49	28,300
November	.....	375	406	1.14	1.27	24,300
December	5,500	340	1,690	4.75	5.48	104,000
January	.....	826	1,730	4.86	5.60	106,000
February	1,310	752	966	2.71	2.82	53,600
March	1,130	686	803	2.26	2.61	49,400
April	1,670	992	1,260	3.54	3.95	75,000
May	2,070	1,120	1,520	4.27	4.92	93,500
June	2,000	938	1,440	4.04	4.51	85,700
July	1,020	710	839	2.36	2.72	51,600
August	734	575	630	1.77	2.04	38,700
September	674	540	585	1.64	1.83	34,800
The year	5,500	340	1,030	2.89	39.24	745,000

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BIG MUDDY CREEK NEAR GLENWOOD, WASH.

Location.—In NE. ¼ sec. 3, T. 8 N., R. 12 E., a few hundred feet above mouth of Cougar Creek and 9 miles north of Glenwood, Klickitat County.

Drainage area.—Not measured.

Records available.—November 12, 1916, to September 30, 1918, when station was discontinued. Record almost directly comparable with that obtained about 3 miles above mouth August 28 to November 12, 1916.

Gage.—Stevens continuous water-stage recorder on right bank. Location changed March 30, 1918, about 200 feet below previous site. Observer, A. G. Hanson.

Discharge measurements.—Made from foot log just above gage.

Channel and control.—Heavy boulders; shifting. Velocities very high; bottom rough. Several channels at high stages.

Extremes of discharge.—Maximum stage during year from high-water marks, about 4.5 feet during flood of December (discharge not determined); minimum stage from water-stage recorder, 1.83 feet December 8 (discharge, 65 second-feet).

1916–1918: Maximum stage same as for 1918; minimum stage recorded, 1.21 feet April 3, 1917 (discharge, 35 second-feet).

Ice.—Stage-discharge relation not affected by ice.

Diversions.—None.

Regulation.—None.

Accuracy.—Stage-discharge relation changed frequently during the year. Several rating curves were used, based on fourteen discharge measurements. Water-stage recorder did not operate satisfactorily there being many breaks in the record. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, except for periods when recorder did not operate for which it was ascertained by comparison with flow of Klickitat River below Big Muddy Creek; maximum and minimum points from the recorder sheet aided materially in this comparison. Records good.

Discharge measuresemts of Big Muddy Creek near Glenwood, Wash., during the period Oct. 1, 1917, to Nov. 6, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	A. G. Hanson	2.12	161	June 9	A. G. Hanson	2.59	261
21	do	2.00	78	23	do	2.57	322
Nov. 15	do	1.78	56	30	Henshaw and Hanson	2.31	240
Mar. 30	do	2.00	101	July 28	A. G. Hanson	1.91	200
Apr. 14	do	2.04	104	Aug. 14	do	2.01	230
28	do	2.07	109	Oct. 8	do	1.91	90
May 26	do	2.04	112	Nov. 6	do	1.28	82

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Daily discharge, in second-feet, of Big Muddy Creek near Glenwood, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.
1	158	69	69	100	122		270	
2	158	69	60	102	152		270	
3	158	116	64	108	185		255	
4	158	109	64	112	185		240	
5	158	96	67	130	158	175	255	
6	158	90	64	128	155		270	
7	158	84	64	125	150		270	250
8	168	76	65		140		270	
9	168	71	.....		130	250	270	
10	158	65	.....		a 125		270	
11	148	64	.....	120	a 120		255	
12	138	71	.....		114			
13	130	69	.....					
14	136	64	.....	108				240
15	122	60	.....	108				225
16	112	60	.....	108		275		210
17	94	60	.....	108				182
18	90	60	.....	112				172
19	80	60	.....	114	125			165
20	76	78	.....				250	153
21	78	80	.....					145
22	80	76	.....					155
23	80	74	.....			315		190
24	80	73	.....	120				240
25	78	71	.....					240
26	78	67	.....		108	300		270
27	76	65	.....					
28	74	65	.....	120			225	
29	74	60	.....	125	115		270	200
30	73	71	.....	130		285	300	
31	69	.....	.....	.....		.....	300	

a Interpolated.

NOTE.—Braced figures show mean discharge for periods indicated, estimated by comparison with flow of Klickitat River using maximum and minimum points from recorder sheet.

Monthly discharge of Big Muddy Creek near Glenwood, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	168	69	115	7,070
November	116	60	73.1	4,350
December 1-8	69	60	64.6	1,020
April	.....	.....	117	6,960
May	.....	.....	131	8,060
June	.....	.....	254	15,100
July	.....	.....	258	15,900
August	.....	.....	221	13,600

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HOOD RIVER BASIN.

HOOD RIVER AT POWERDALE, NEAR HOOD RIVER, OREG.

Location.—In NE. ¼ sec. 36, T. 3 N., R. 10 E., at Powerdale, three-quarters of a mile south of Hood River, Hood River County, above discharge of tailrace of Powerdale plant of Pacific Power & Light Co., and 1½ miles above mouth of stream.

Drainage area.—Not measured.

Records available.—March 31, 1913, to September 30, 1918.

Gage.—Vertical staff on right bank opposite power plant, about half a mile above railroad bridge, used March 31, 1913, to September 30, 1914, and since December 21, 1915; read by A. Rogers. Vertical staff on left bank just below bridge of Mount Hood Railway, October 1, 1914, to July 26, 1915; water-stage recorder at same location July 27 to December 21, 1915.

Discharge measurements.—Made from cable 100 feet above upper gage.

Channel and control.—Rock and boulders; shifts slightly.

Extremes of discharge.—Maximum stage during year determined from high-water marks, 8.9 feet December 18 or 19 (occurred during night) (discharge, 17,200 second-feet); minimum stage recorded, 1.00 foot at noon September 4 (discharge, 210 second-feet), owing to ponding of water at Dee.

1913–1918: Maximum stage recorded same as for 1918; minimum stage recorded, 1.33 feet September 4, 1915 (discharge, estimated from extension of rating curve, 176 second-feet).

Ice.—Stage-discharge relation not affected by ice.

Diversions.—Large diversions for irrigation above station; water for power plant is diverted around upper gage but is returned above the bridge gage. A record of this diversion has been kept (p. 69).

Regulation.—Water stored at sawmill at Dee causes sudden fluctuations at low water, but this has been much less noticeable since 1916 than in 1914 or 1915.

Accuracy.—Stage-discharge relation changed December 18. Two well defined rating curves used, applicable October 1 to December 18, and December 19 to September 30. Gage read to quarter-tenths four times daily to August 23; after that date read hourly during daylight and mean of readings used as mean for the day. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of Hood River at Powerdale, near Hood River, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 23	R. C. Briggs	1.57	331	Feb. 5	R. C. Briggs	4.21	3,100
Dec. 29	C. L. Batchelder	6.57	9,000	May 24	C. L. Batchelder	2.28	899
29	do	6.13	8,100	June 28	F. F. Henshaw	1.91	637
30	do	5.64	6,450	July 18	do	1.89	687
Jan. 14	do	4.05	2,930	Sept. 2	do	1.53	418

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Daily discharge, in second-feet, of Hood River at Powerdale, near Hood River, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	530	400	1,420	4,120	1,530	1,140	1,430	1,140	830	635	545	435
2	530	370	1,060	3,500	1,530	1,140	1,330	1,230	795	635	575	410
3	565	430	980	3,140	1,630	1,230	1,140	1,230	760	635	460	386
4	495	430	1,060	4,120	1,850	1,140	1,140	1,430	760	605	410	284
5	530	315	940	3,320	2,800	1,140	1,140	1,230	795	605	410	254
6	495	340	1,060	3,140	4,340	1,050	1,050	1,050	970	575	360	275
7	460	330	860	3,900	3,900	1,050	970	1,050	970	545	360	297
8	460	340	820	3,320	2,800	1,050	1,050	970	970	460	360	295
9	460	310	780	2,800	2,370	1,050	1,330	1,140	970	487	360	348
10	430	340	780	2,370	2,230	1,050	1,330	970	1,050	487	410	315
11	370	286	740	2,510	1,970	1,050	1,230	970	1,050	460	460	311
12	430	400	1,820	3,320	2,100	1,050	1,230	1,140	1,140	435	385	311
13	460	530	5,250	2,650	1,970	1,050	1,140	970	1,050	410	315	335
14	460	495	5,500	3,140	1,850	970	1,140	1,140	865	435	315	380
15	460	400	3,140	3,320	1,740	970	1,050	1,140	760	460	303	695
16	430	400	3,500	3,700	1,630	970	1,140	1,140	695	575	291	487
17	400	400	8,900	3,500	1,630	1,050	1,140	1,050	695	575	348	435
18	400	400	13,000	3,500	1,530	1,330	1,140	1,050	635	635	360	435
19	400	330	12,700	2,800	1,230	1,140	1,140	1,230	635	575	315	435
20	400	370	5,540	2,370	1,330	1,140	1,140	1,140	635	460	279	410
21	400	370	3,900	2,100	1,330	1,140	1,330	1,050	695	460	254	410
22	430	370	5,800	1,970	1,230	1,530	1,430	970	830	515	303	385
23	460	370	4,340	1,850	1,330	1,430	1,330	970	795	635	360	348
24	430	286	3,140	2,100	1,230	1,430	1,330	900	760	487	360	348
25	400	278	2,230	2,510	1,140	1,630	1,230	865	760	515	410	348
26	495	400	3,500	2,100	1,330	1,530	1,140	830	695	487	385	348
27	430	430	6,880	1,970	1,140	1,530	1,140	830	695	460	360	385
28	370	740	12,300	1,850	1,140	1,530	1,140	830	635	435	307	385
29	370	1,420	8,360	2,100	.....	1,430	1,140	830	635	460	295	515
30	370	2,490	6,600	1,850	.....	1,630	1,140	900	605	460	315	385
31	370	.....	5,280	1,530	.....	1,530	.....	900	.....	487	315	.....

Monthly discharge of Hood River at Powerdale, near Hood River, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	565	370	442	27,200
November	2,490	278	492	29,300
December	13,000	740	4,260	262,000
January	4,120	1,530	2,790	172,000
February	4,340	1,140	1,850	103,000
March	1,630	970	1,230	75,600
April	1,430	970	1,190	70,800
May	1,430	830	1,040	64,000
June	1,140	605	804	47,800
July	635	410	519	31,900
August	575	254	364	22,400
September	830	254	391	23,300
The year	13,000	254	1,280	929,000

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Combined daily discharge, in second-feet, of Hood River and Pacific Power & Light Co.'s tailrace at Powerdale, near Hood River, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	582	483	1,420	4,120	1,530	1,140	1,490	1,190	838	635	628	493
2	579	450	1,060	3,500	1,530	1,140	1,390	1,290	859	635	658	421
3	615	510	980	3,140	1,630	1,230	1,200	1,290	771	635	543	385
4	544	513	1,060	4,120	1,850	1,140	1,200	1,480	812	605	490	354
5	579	401	940	3,320	2,800	1,140	1,170	1,230	850	605	493	344
6	544	426	1,060	3,140	4,340	1,050	1,100	1,110	981	575	443	365
7	482	420	860	3,900	3,900	1,050	970	1,100	981	597	443	377
8	482	437	820	3,320	2,800	1,050	1,100	1,020	981	536	443	381
9	550	407	780	2,800	2,370	1,050	1,330	1,190	1,050	563	443	438
10	520	434	780	2,370	2,230	1,050	1,390	1,020	1,060	584	490	405
11	460	369	740	2,510	1,970	1,050	1,280	1,020	1,060	557	524	401
12	520	497	1,900	3,320	2,100	1,050	1,290	1,150	1,150	525	468	401
13	550	634	5,340	2,650	1,970	1,050	1,200	1,040	1,100	507	398	475
14	474	592	5,600	3,140	1,850	1,010	1,150	1,210	948	525	398	920
15	546	497	3,240	3,320	1,740	1,050	1,110	1,210	843	550	386	709
16	516	497	3,550	3,700	1,630	1,010	1,200	1,210	778	665	352	577
17	486	497	8,970	3,500	1,630	1,100	1,200	1,120	778	665	431	525
18	490	497	13,000	3,500	1,530	1,390	1,200	1,120	718	718	374	525
19	490	427	12,700	2,800	1,230	1,210	1,200	1,240	732	672	401	525
20	483	467	5,540	2,370	1,330	1,190	1,200	1,200	725	557	369	496
21	483	467	3,900	2,100	1,330	1,210	1,390	1,120	785	512	344	496
22	516	467	5,800	1,970	1,230	1,600	1,490	1,040	875	612	393	468
23	546	467	4,340	1,850	1,330	1,500	1,390	1,040	795	711	450	431
24	516	383	3,140	2,100	1,230	1,510	1,390	952	760	577	450	431
25	486	375	2,230	2,510	1,140	1,710	1,290	917	760	605	496	431
26	495	400	3,500	2,100	1,330	1,600	1,200	882	695	577	475	438
27	500	430	6,880	1,970	1,140	1,580	1,200	838	695	550	450	443
28	460	740	12,300	1,850	1,140	1,580	1,140	838	635	532	397	468
29	453	1,420	8,360	2,100	.....	1,440	1,200	838	635	557	385	570
30	456	2,490	6,600	1,850	.....	1,640	1,200	908	605	557	405	468
31	453	.....	5,280	1,530	.....	1,540	.....	908	.....	577	405	.....

Combined monthly discharge of Hood River and Pacific Power & Light Co.'s tailrace at Powerdale, near Hood River, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	615	453	511	31,400
November	2,490	369	570	33,900
December	13,000	740	4,280	263,000
January	4,120	1,530	2,790	172,000
February	4,340	1,140	1,850	103,000
March	1,710	1,010	1,260	77,500
April	1,490	970	1,240	73,800
May	1,480	838	1,090	67,000
June	1,150	605	842	50,100
July	718	507	590	36,300
August	658	344	446	27,400
September	920	344	472	28,100
The year	13,000	344	1,330	963,000

EAST FORK OF HOOD RIVER NEAR MOUNT HOOD, OREG.

LOCATION.—In SW. ¼ sec. 4, T. 1 S., R. 10 E., 1,000 feet above intake of East Fork Irrigation District canal, three-quarters of a mile above toll bridge and former gage, and 2 miles south of Mount Hood post office, Hood River County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 22, 1915, to October 16, 1918, when record was temporarily discontinued.

GAGE.—Stevens water-stage recorder on left bank; inspected by C. H. Shaw.

DISCHARGE MEASUREMENTS.—Made from cable 15 feet below gage or by wading.

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Monthly discharge of East Fork of Hood River near Mount Hood, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	172	138	153	9,410
November	1,020	128	176	10,500
December 1-18	1,860	148	360	12,900
March	288	238	257	15,800
April	300	260	278	16,500
May	360	248	295	18,100
June	395	226	304	18,100
July	238	180	212	13,000
August	210	166	185	11,400
September	268	159	180	10,700

EAST FORK IRRIGATION DISTRICT CANAL NEAR MOUNT HOOD, OREG.

LOCATION.—In SE. ¼ sec. 33, T. 1 N., R. 10 E., 1 mile below intake, 1½ miles south of Mount Hood post office, Hood River County, and 2 miles east of Parkdale station on Mount Hood Railroad.

RECORDS AVAILABLE.—June 17, 1913, to October 26, 1914; July 21, 1915, to September 30, 1918.

GAGE.—Stevens eight-day water-stage recorder on left side of canal just above road crossing, inspected by F. A. McDonald and C. H. Shaw. Vertical staff on side of flume, 1,000 feet downstream, in SW. ¼ sec. 34, used until October, 1914.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Smooth earth section. Head of flume probably acts as control; shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.42 feet at 4 a. m. July 17 (discharge, 138 second-feet); canal dry at various times.

1913–1918: Maximum stage recorded, 3.35 feet at 2 a. m. July 17, 1917 (discharge, 143 second-feet).

ICE.—No water carried in cold weather.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined above 20 second-feet. Operation of recorder satisfactory. Daily discharge ascertained by shifting-control method; mean daily gage height obtained by inspecting recorder graph. Records good.

East Fork Irrigation District canal diverts water in SW. ¼ sec. 4, T. 1 S., R. 10 E., and irrigates land lying east of Hood River. Most of the return water reaches Neal Creek and lower part of Hood River.

Discharge measurements of East Fork Irrigation District canal near Mount Hood, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 24	R. C. Briggs	1.75	29.5	July 18	F. F. Henshaw	3.24	124
May 25	C. L. Batchelder	2.45	68	Aug. 31	do	3.00	107
June 29	F. F. Henshaw	3.21	110				

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Daily discharge, in second-feet, of East Fork Irrigation District canal near Mount Hood, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	34	32	22	44	100	116	129	112
2	34	32	22	47	100	112	124	108
3	35	33	22	51	100	112	120	108
4	35	32	22	55	112	112	116	108
5	[a] 34	31	22	54	120	112	112	104
6	34	30	22	55	124	112	116	100
7	34	30	22	59	124	112	116	100
8	34	30	22	73	120	116	120	104
9	34	30	23	78	120	120	116	104
10	35	32	24	78	120	120	129	100
11	34	32	24	78	120	120	124	96
12	34	35	24	81	120	120	116	96
13	33	34	24	81	120	120	120	96
14	33	32	24	81	116	120	120	88
15	33	32	24	73	112	129	112	71
16	33	32	24	72	116	134	108	67
17	33	31	24	72	116	134	108	56
18	33	31	24	72	112	129	108	52
19	33	31	24	71	116	124	108	52
20	32	31	24	71	116	124	104	53
21	33	32	25	70	120	124	104	47
22	33	31	25	70	120	124	116	44
23	33	30	24	71	120	120	120	44
24	34	30	24	70	116	120	116	42
25	34	30	24	73	112	124	112	42
26	33	30	23	71	112	120	108	43
27	32	31	23	68	116	116	104	38
28	31	33	23	73	116	120	104	32
29	32	29	23	81	112	124	108	32
30	32	11	36	84	112	129	108	32
31	32	.....	.....	96	.....	129	112	.....

[a] Interpolated.

Monthly discharge of East Fork Irrigation District canal near Mount Hood, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	35	31	33.3	2,050
November	35	11	30.7	1,830
April	36	22	23.8	1,430
May	96	44	70.1	4,310
June	124	100	115	6,840
July	134	112	121	7,440
August	129	104	114	7,010
September	112	32	72.4	4,310

PACIFIC POWER & LIGHT CO.'S TAILRACE NEAR HOOD RIVER, OREG.

LOCATION.—In SE. ¼ sec. 36, T. 3 N., R. 10 E., just below power house, opposite upper gage on Hood River, three-quarters of a mile south of Hood River, Hood River County.

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1914; January 1, 1916, to September 30, 1918.

GAGE.—Vertical staff on right bank of tailrace, at different datum from that of gage used 1913 to 1914; read by A. Rogers.

DISCHARGE MEASUREMENTS.—Made from footbridge just below gage.

CHANNEL AND CONTROL.—Flume 11 feet wide extends a few feet down from gage; below this the canal is excavated in gravel.

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Extremes of discharge.—Maximum stage recorded, 2.10 feet November 13 and December 14 and 17 (discharge, 104 second-feet); canal dry at various times.

1914 and 1916–1918: Maximum discharge, 110 second-feet, determined from electric output February 20, 1914; canal dry at various times.

Ice.—Stage-discharge relation never affected by ice.

Accuracy.—Stage-discharge relation changed during winter when power plant was not in use. Two well-defined rating curves used, applicable October 1 to December 17 and March 14 to September 30. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for days when there was a great difference in the two readings. For such days discharge is average of results obtained by applying both gage heights to rating table. Records good.

Pacific Power & Light Co.'s canal diverts water from Hood River at a dam in NE. ¼ sec. 1, T. 2 N., R. 10 E., to a power plant in SE. ¼ sec. 36, T. 3 N., and the tailrace empties into the river in NE ¼ sec. 36, below gage on Hood River at Powerdale and above gage at bridge.

Discharge measurements of Pacific Power & Light Co.'s tailrace near Hood River, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 13	C. E. Stricklin	1.95	92	July 18	F. F. Henshaw	1.70	68
May 25	C. L. Batchelder	1.40	51	Sept. 2	do	.50	11.9

Daily discharge, in second-feet, of Pacific Power & Light Co.'s tailrace near Hood River, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	52	83			64	52	8		83	58
2	49	80			61	58	64		83	11
3	50	80			55	58	11		83	90
4	49	83			55	55	52		80	90
5	49	86			28		55		83	90
6	49	86			52	58	11		83	90
7	22	90				52	11	52	83	90
8	22	97			52	55	11	76	83	86
9	90	97				52	83	76	83	90
10	90	94			64	52	11	97	80	90
11	90	83			52	52	11	97	64	90
12	90	97	83		58	8	11	90	83	90
13	90	104	86		58	67	47	97	83	90
14	14	97	104	37	8	73	83	90	83	90
15	86	97	97	83	64	70	83	90	83	14
16	86	97	47	41	64	67	83	90	61	90
17	86	97	69	52	64	70	83	90	83	90
18	90	97		61	61	70	83	83	14	90
19	90	97		70	64	8	97	97	86	90
20	83	97		46	64	61	90	97	90	86
21	83	97		70	64	70	90	52	90	86
22	86	97		70	58	67	45	97	90	83
23	86	97		70	61	70		76	90	83
24	86	97		76	58	52		90	90	83
25	86	97		76	64	52		90	86	83
26				73	58	52		90	90	90
27	70			52	58	8		90	90	83
28	90			52		8		97	90	83
29	83			8	61	8		97	90	55
30	86			8	55	8		97	90	83
31	83			8		8		90	90	

Note.—Tailrace dry during periods for which no discharge is given.

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Monthly discharge of Pacific Power & Light Co.'s tailrace near Hood River, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October (30 days)	90	14	72.2	4,300
November (25 days)	104	80	93.0	4,610
December (6 days)	104	47	81.0	964
March (18 days)	83	8	52.9	1,880
April (27 days)	64	8	56.5	3,030
May (30 days)	73	8	48.0	2,860
June (22 days)	97	8	51.0	2,230
July (25 days)	97	52	87.5	4,340
August	90	14	81.9	5,040
September	90	11	80.6	4,800
The year				34,100

WHITE SALMON RIVER BASIN.

WHITE SALMON RIVER NEAR GULER, WASH.

LOCATION.—In SE. ¼ sec. 24, T. 6 N., R. 10 E., at highway bridge a quarter of a mile above intake of Huber ditch, three-quarters of a mile below mouth of Trout Creek, and 3 miles below Guler post office, Klickitat County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 17 to September 30, 1918.

GAGE.—Chain gage on chord of bridge, read by C. H. Gossett, engineer for Northwestern Electric Co.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed composed of rock thinly overlain with gravel. Control is a large log placed just below intake of Huber ditch; somewhat shifting. Current sluggish.

ACCURACY.—Stage-discharge relation not permanent. Rating curve based on two measurements, used July 17 to August 21; shifting-control method used thereafter. Gage read to hundredths once nearly every day. Daily discharge prior to August 21, ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Field data furnished by Northwestern Electric Co.

Discharge measurements of White Salmon River near Guler, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 17	F. F. Henshaw	2.00	404
Aug. 20	C. H. Gossett [a]	1.32	170
Sept. 23	do	1.30	133

[a] Engineer for Northwestern Electric Co.

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Daily discharge, in second-feet, of White Salmon River near Guler, Wash., for the year ending Sept. 30, 1918.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1		196		11		a 174	132	21	a 196	169	136
2		196		12		169	130	22	208	169	a 134
3		185		13		a 169	a 130	23	223	182	132
4		a 184		14		169	185	24	196	177	134
5		a 182		15		a 159	a 166	25	202	a 172	136
6		a 181		16		149	146	26	196	167	140
7		180	122	17	405	169	144	27	185	a 162	144
8		164	a 130	18	328	172	138	28	a 197	157	144
9		155	138	19	220	174	140	29	a 208	162	a 146
10		180	126	20	185	169	144	30	220	162	149
								31	202		

a Interpolated.

Monthly discharge of White Salmon River near Guler, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July 17-31	405	185	225	6,690
August 1-30	196	149	172	10,200
September 7-30	185	122	140	6,660

WHITE SALMON RIVER AT HUSUM, WASH.

LOCATION.—In SE. ¼ sec. 25, T. 4 N., R. 10 E., 1,000 feet above falls and power house at Husum, Klickitat County, and three-quarters of a mile above Rattlesnake Creek.

DRAINAGE AREA.—293 square miles (measured on map of Columbia National Forest). This is a revision, the area being given in previous reports as 300 square miles.

RECORDS AVAILABLE.—September 23, 1909, to September 30, 1918.

GAGE.—Vertical staff on right bank; read by John Wassell and Clark McClellan. Fuller water-stage recorder used October, 1912, to February, 1915.

DISCHARGE MEASUREMENTS.—Made from cable 100 feet below gage.

CHANNEL AND CONTROL.—Gravel and lava boulders; practically permanent. Control is crest of falls, which is sometimes obstructed by logs, causing backwater.

EXTREMES OF DISCHARGE.—Maximum stage during year as determined from high-water marks, 10.0 feet about 4 p. m. December 29, 1917 (discharge, 7,500 second-feet); minimum stage recorded, 3.09 feet November 26 and 27 (discharge, 505 second-feet).

1909–1918: Maximum stage same as for 1918; minimum stage recorded, 2.66 feet at 2 p. m. September 30, 1915 (discharge, 432 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—About 3,500 acres irrigated above this station.

REGULATION.—None. Flow formerly affected at times by operation of splash dam 10 miles upstream; no logging on stream at present.

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ACCURACY.—Stage-discharge relation changed October 28, owing to fallen tree below gage, and December 17 during flood. Two well-defined rating curves used, applicable October 1 to December 17 and December 18 to September 30. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table, except for period August 8 to 30, when intake to stilling well was clogged with silt, making the gage readings considerably in error, for which it was ascertained by comparison with flow of White Salmon River near Underwood. Gage heights October 28 to December 17 corrected for effect of backwater due to fallen tree, before applying them to rating table. Records good.

Discharge measurements of White Salmon River at Husum, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 20	C. L. Batchelder	3.10	582	July 2	F. F. Henshaw	3.80	800
Jan. 16	do	5.38	1,910	July 17	do	3.82	828
May 24	do	4.02	882	Sept. 1	do	3.32	569

Daily discharge, in second-feet, of White Salmon River at Husum, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	675	565	630	3,980	1,420	1,200	1,340	1,200	840	790	672	565
2	675	545	505	3,380	1,420	1,200	1,340	1,200	890	790	672	565
3	630	565	525	3,160	1,420	1,200	1,270	1,200	890	790	672	565
4	630	585	675	3,270	1,500	1,200	1,200	1,200	890	790	650	565
5	630	585	630	2,830	1,500	1,130	1,200	1,270	890	790	650	565
6	630	585	545	2,520	2,320	1,130	1,200	1,200	890	790	650	565
7	630	565	545	2,420	2,320	1,130	1,200	1,200	840	790	650	565
8	630	545	545	2,220	2,020	1,130	1,200	1,270	840	740		565
9	630	545	525	1,930	1,980	1,130	1,200	1,130	840	740		565
10	630	565	525	1,930	1,930	1,130	1,420	1,130	890	740		565
11	630	545	525	1,930	1,840	1,130	1,420	1,130	890	740		565
12	608	585	545	1,750	1,750	1,130	1,340	1,070	840	740		565
13	608	585	675	1,660	1,750	1,130	1,270	1,130	840	740		565
14	608	565	870	1,660	1,660	1,070	1,200	1,130	840	790		605
15	608	545	1,440	1,660	1,580	1,070	1,200	1,070	790	790		605
16	585	525	2,220	1,930	1,580	1,070	1,200	1,010	790	790		605
17	585	525	2,800	2,020	1,580	1,070	1,130	1,010	790	790		605
18	585	545	6,670	2,120	1,500	1,130	1,130	1,010	790	790		605
19	585	545	6,280	2,120	1,420	1,130	1,130	1,010	790	740	580	605
20	585	545	4,100	1,930	1,420	1,130	1,200	1,010	790	718		585
21	585	525	2,120	1,840	1,340	1,130	1,270	950	840	695		585
22	585	525	2,940	1,750	1,340	1,420	1,340	950	840	695		585
23	585	525	2,940	1,750	1,340	1,420	1,340	890	840	695		585
24	585	505	2,420	1,750	1,270	1,420	1,340	890	840	718		565
25	585	505	1,750	1,750	1,270	1,580	1,270	890	840	695		565
26	585	505	1,750	1,660	1,270	1,500	1,270	890	790	695		565
27	585	505	3,050	1,580	1,270	1,420	1,200	890	840	695		545
28	585	525	4,220	1,580	1,270	1,340	1,200	840	790	695		545
29	585	630	7,220	1,580	.....	1,340	1,270	840	790	695		545
30	565	630	5,240	1,500	.....	1,340	1,200	890	790	672		545
31	565	.....	5,240	1,420	.....	1,420	.....	890	.....	695		.....

NOTE.—Braced figure shows estimated mean discharge for period indicated.

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Monthly discharge of White Salmon River at Husum, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	675	565	606	37,300
November	630	505	551	32,800
December	7,220	505	2,280	140,000
January	3,980	1,420	2,080	128,000
February	2,320	1,270	1,580	87,800
March	1,580	1,070	1,220	75,000
April	1,420	1,130	1,250	74,400
May	1,270	840	1,040	64,000
June	890	790	835	49,700
July	790	672	743	45,700
August	672	.....	598	36,800
September	605	545	573	34,100
The year	7,220	505	1,110	806,000

WHITE SALMON RIVER NEAR UNDERWOOD, WASH.

LOCATION.—In NW. ¼ sec. 14, T. 3 N., R. 10 E., 200 yards below Northwestern Electric Co.'s power plant and 2 miles north of Underwood, Skamania County.

DRAINAGE AREA.—384 square miles (measured on map of Columbia National Forest).

RECORDS AVAILABLE.—March 1, 1915, to September 30, 1918; October 18, 1912, to February 26, 1913, at dam about a mile above.

GAGE.—Gurley water-stage recorder on left bank June 27 to July 16, 1918; moved to right bank July 17 at datum 1.0 foot lower. Friez and Fuller recorders on left bank prior to June 27, inspected by D. J. Shore, foreman of power plant.

DISCHARGE MEASUREMENTS.—Made from cable at gage; measuring conditions good.

CHANNEL AND CONTROL.—Rock and gravel; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage from high-water marks, 9.5 feet (old gage datum) January 17 (discharge, estimated from extension of rating curve, 9,700 second-feet); minimum stage occurred 8 to 11 a. m. August 18, when a shut-down of the power plant reduced the discharge practically to zero.

1915–1918: Maximum and minimum stages same as for 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—About 3,500 acres irrigated above this station.

REGULATIONS.—At low and medium stages practically all the water is used through the wheels of the power plant. The pond above the dam covers about 80 acres.

ACCURACY.—Stage-discharge relation changed July 17 owing to moving of water-stage recorder to new location. (See under "Gage.") Two rating curves, both well defined above 300 second-feet, used as follows: Rating curve for 1917 applicable prior to July 17; a new curve, based on discharge measurements for 1918 and previous measurements above 3.0 feet corrected to new datum, used thereafter, Operation of water-stage recorder satisfactory beginning June 27 except for a few days. Daily discharge ascertained by use of discharge integrator, or, for periods when water was practically all used through wheels of power plant, by averaging discharge for two-hour intervals computed from electrical output of the plant; the daily discharge thus obtained, when under 1,000 second-feet, has been corrected for effect of storage of water behind dam at plant. Records goop October to December, excellent June to September.

Discharge measurements of White Salmon River near Underwood, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 13	C. L. Batchelder	1.40	794	June 26	F. F. Henshaw	1.44	999
Jan. 17	do	3.48	2,570	27	do	1.02	750
June 26	F. F. Henshaw	1.66	1,100	Sept. 1	do	[a] 1.32	402

[a] Referred to new gage on right bank.

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Daily discharge, in second-feet, of White Salmon River near Underwood, Wash., for the years ending Sept. 30, 1915–1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915.												
1						980	1,710	1,280			a590	564
2						920	a2,800	1,220			a590	578
3						980	a3,000	1,160			a680	564
4						1,100	2,130	1,160			a635	554
5						1,100	1,790	1,160			a580	554
6						1,100	1,630	1,160			a590	606
7							1,630	1,160			a590	582
8							1,560	1,160			a590	582
9							1,420	1,040			a590	538
10						a920	1,350	1,100			a590	
11							1,490	1,160			580	a547
12							1,480	1,160			590	
13						980	1,420	1,180			590	
14						1,160	1,360	1,220			590	576
15						1,350	1,350	1,220			590	578
16						1,490	1,350	1,280			587	565
17						1,490	1,490	1,280			568	578
18						1,490	a1,660	1,220			570	535
19						1,490	a1,660	1,220			580	524
20						1,280	1,710	1,160			600	547
21						1,350	1,630	a1,110			620	547
22						1,350	1,630	a1,050			650	522
23						1,490	1,420	a1,050			590	546
24						1,560	1,350	a1,050			600	550
25						1,350	1,350	a1,050			660	581
26						1,280	1,350	a1,050			570	580
27						1,280	1,420	a1,050			587	587
28						a1,440	1,350	a1,170			591	587
29						a1,440	1,350	a1,170			600	558
30						a1,600	1,350	a1,050			599	582
31						a1,600		a1,050			568	
1915–16.												
1	584	659	664			1,400	2,400	2,310		2,150	1,380	1,060
2	548	567	658			1,390	2,400	2,400		2,570	1,310	1,030
3	516	589	672			1,450	2,490	2,580		2,800	1,280	1,120
4	526	565	736			1,420	2,490	2,870		2,500	1,300	1,120
5	544	537	864			1,490	2,400	2,870		2,280	1,320	1,160
6	538	535	844			1,560	2,310	2,870	a2,300	2,120	1,330	1,070
7	519	496				1,550	2,310	2,770		2,180	1,400	1,050
8	520	512				1,960	2,310	2,580		2,130	1,300	1,050
9	487	530				2,350		2,400		2,130	1,300	1,070
10	524	552				2,550		2,310		2,100	1,360	1,060
11	483	520				2,630	a2,400	2,130		2,030	1,310	1,050
12	516	509				2,710		1,950		2,000	1,320	1,040
13	512	490				2,670			2,130	2,000	a1,310	1,030
14	525	492				2,330			2,210	1,910		1,020
15	514	537				1,870	2,400	a2,000	2,330	1,960		1,010
16	498	592				1,660	2,310		2,550	2,020	a1,240	1,040
17	469	629				1,690	2,310	2,040	2,700	2,050		1,040
18	501	742				1,710	2,310	2,170	a3,300	1,960		1,030
19	493	750				a2,000	2,220	2,210	a3,000	1,900	1,160	1,010
20	498	780				a3,000	2,130	2,200	2,580	1,850	1,140	980
21	480	860				3,470	2,220	1,990	2,270	1,810	1,150	980
22	496	860				3,470	2,130	1,990	2,140	1,710	1,140	980
23	536	1,120				3,070	2,100	1,990	2,180	1,580	1,130	950
24	504	912				2,770	2,040	1,940	2,220	1,610	1,130	910
25	568	980				3,070	2,040	1,910	2,220	1,550	1,150	981
26	539	814				3,570	2,220	1,950	2,230	1,490	1,130	903
27	527	762				3,470	2,310		2,250	1,440	1,120	879
28	522	716				3,070	2,310		2,180	1,420	1,100	861
29	529	754				2,770	2,310	a2,000	2,050	1,380	1,080	858
30	509	690				2,490	2,310		2,030	1,340	1,080	879
31	502					2,400				1,370	1,020	

a Estimated by comparison with flow of White Salmon River at Husum.

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Daily discharge, in second-feet, of White Salmon River near Underwood, Wash., for the year ending Sept. 30, 1915–1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1916–17.												
1	871	700	768	744	644	666	1,140	1,400	1,950	1,630	1,070	878
2	889	740	734	738	664	664	1,190	1,430	1,900	1,690	1,070	850
3	843	734	901	760	724	646	1,120	1,410	1,840	1,680	1,060	974
4	869	1,030	821	784	1,240	664	1,140	1,370	1,790	1,750	1,050	918
5	839	804	834	956	824	720	1,230	1,410	1,800	1,620	1,040	864
6	842	634	760	952	800	746	1,260	1,550	1,810	1,600	1,020	796
7	835	674	742	924	806	756	1,590	1,670	1,910	1,430	1,010	838
8	[a] 800	700	730	816	812	748	1,630	1,830	1,990	1,470	1,010	824
9	740	726	698	804	702	736	1,560	1,890	2,130		1,040	804
10	758	720	653	814	750	724	1,550	2,010	1,960		990	852
11	774	680	676	776	744	720	1,520	1,970	1,800	[a] 1,440	990	866
12	746	604	720	830	758	718	1,450		1,630		990	832
13	742	584	732	720	744	740	1,370		1,660		980	828
14	740	614	700	[a] 700	760	712	1,370		1,750		980	770
15	[a] 750	622	696	[a] 680	758	702	1,320		1,880	1,420	940	854
16	742	644	702	652	786	696	1,290	[a] 1,700	1,950	1,380	920	818
17	780	648	664	644	782	692	1,250			1,340	910	868
18	770	678	652	636	702	632	1,220			1,280	910	814
19	774	586	696	664	744	708	1,160			1,270	[a] 910	820
20	760	572	718	696	766	736	1,230	1,660	[a] 1,870	1,230	[a] 920	810
21	770	686	740	842	756	744	[a] 1,300	1,700		1,200	960	778
22	[a] 730	714	764	679	732	726	[a] 1,300	1,680		1,180	918	818
23	[a] 724	734	734	687	690	852	[a] 1,400	1,690		1,150	932	788
24	744	700	780	745	720	1,040	[a] 1,400	1,730	1,790	1,130	895	702
25	744	796	770	639	692	978	1,490	1,720	1,690	1,090	890	738
26	758	837	640	681	718	900	1,540	1,710	1,580	1,100	[a] 890	772
27	764	949	658	631	700	1,160	1,620	1,920	1,580	1,100	[a] 900	754
28	750	869	634	842	690	1,440	1,560	2,000	1,580	1,090	920	750
29	[a] 718	779	622	703	.....	1,280	1,520	2,020	1,570	1,080	920	742
30	702	804	608	684	.....	1,210	1,490	2,080	1,560	1,070	930	752
31	742	.....	636	624	.....	992	.....	2,020	.....	1,070	930	.....
1917–18.												
1	660	576	708	.....	.....	.....	.....	.....	966	868	785	634
2	710	582	626	.....	.....	.....	.....	.....	892	862	740	662
3	700	590	610	.....	.....	.....	.....	.....	954	816	696	655
4	666	[a] 596	630	.....	.....	.....	.....	.....	922	812	702	650
5	712	[a] 592	600	.....	.....	.....	.....	.....	948	842	716	652
6	700	[a] 600	598	.....	.....	.....	.....	.....	966	822	676	652
7	682	[a] 612	572	.....	.....	.....	.....	.....	996	774	666	640
8	624	[a] 576	552	.....	.....	.....	.....	.....	996	856	672	568
9	674	568	552	.....	.....	.....	.....	.....	964	828	644	600
10	666	582	504	.....	.....	.....	.....	.....	898	810	666	604
11	660	[a] 572	560	.....	.....	.....	.....	.....	966	840	631	606
12	640	[a] 562	594	.....	.....	.....	.....	.....	958	802	644	606
13	676	510	818	.....	.....	.....	.....	.....	970	792	638	598
14	[a] 678	612	1,200	.....	.....	.....	.....	.....	988	786	637	682
15	[a] 642	570	[a] 1,920	.....	.....	.....	.....	.....	916	848	620	606
16	632	548	[a] 2,960	.....	.....	.....	.....	.....	902	878	623	662
17	634	556	[a] 3,730	.....	.....	.....	.....	.....	864	912	592	635
18	624	530	[a] 8,860	.....	.....	.....	.....	.....	906	954	647	595
19	648	530	[a] 8,370	.....	.....	.....	.....	.....	874	860	636	630
20	652	566	[a] 6,070	.....	.....	.....	.....	.....	890	746	614	676
21	576	558	[a] 2,830	.....	.....	.....	.....	.....	852	738	635	590
22	608	550	[a] 3,920	.....	.....	.....	.....	.....	936	791	623	574
23	640	544	[a] 3,920	.....	.....	.....	.....	.....	872	780	654	606
24	610	554	[a] 3,230	.....	.....	.....	.....	.....	948	726	656	594
25	610	498	[a] 2,330	.....	.....	.....	.....	.....	880	808	636	585
26	616	530	[a] 2,330	.....	.....	.....	.....	.....	882	808	645	606
27	716	538	[a] 4,070	.....	.....	.....	.....	.....	869	810	624	590
28	[a] 584	696	[a] 5,630	.....	.....	.....	.....	.....	892	809	608	596
29	[a] 564	682	[a] 9,200	.....	.....	.....	.....	.....	846	790	601	586
30	600	710	[a] 6,990	.....	.....	.....	.....	.....	842	774	609	628
31	590	.....	[a] 6,990	.....	.....	.....	.....	.....	.....	781	648	.....

[a] Estimated by comparison with flow of White Salmon River at Husum.

NOTE.—Daily discharge less than 1,000 second-feet has been corrected for effect of storage. Some records for October, 1916, and September, 1917, have been revised on the basis of further study, and do not agree with those published in Water-Supply Paper 464. Discharge for March to May, 1915, has not been previously published; operation of recorder not satisfactory during this period, but results are consistent with those at Husum and are considered fair.

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Monthly discharge of White Salmon River near Underwood, Wash., for the years ending Sept. 30, 1915–1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
March	[a] 1,600	920	1,230	75,600
April	[a] 3,000	1,350	1,610	95,800
May	1,280	1,040	1,150	70,100
June	[a] 1,050	[a] 725	[a] 812	48,300
July	[a] 770	[a] 590	[a] 687	42,200
August	[a] 680	568	596	36,600
September	606	522	556	33,100
The period				401,700
1915–16.				
October	584	469	517	31,800
November	1,120	490	668	39,700
December	[a] 2,920	658	[a] 1,110	68,200
January	[a] 1,430	[a] 735	[a] 874	53,700
February	[a] 1,960	[a] 825	[a] 1,400	80,500
March	3,570	1,390	2,360	145,000
April	2,490	2,040	2,310	137,000
May	2,870	1,910	2,210	136,000
June	[a] 3,300	2,030	2,340	139,000
July	2,800	1,340	1,910	117,000
August	1,400	1,020	1,220	75,000
September	1,120	858	1,000	59,500
The year	3,570	469	1,490	1,080,000
1916–17.				
October	889	702	775	47,700
November	1,030	572	719	42,800
December	901	608	716	44,000
January	955	624	744	45,700
February	1,240	644	757	42,000
March	1,440	632	821	50,500
April	1,630	1,120	1,370	81,500
May	2,030	1,370	1,720	106,000
June	2,130	1,560	1,810	108,000
July	1,750	1,070	1,340	82,400
August	1,070	890	964	59,300
September	974	702	816	48,600
The year	2,130	572	1,050	760,000
1917–18.				
October	716	564	645	39,700
November	710	493	576	34,300
December	[a] 9,200	504	2,980	183,000
January	[a] 5,310	[a] 1,890	[a] 2,780	171,000
February	[a] 3,090	[a] 1,690	[a] 2,110	117,000
March	[a] 2,110	[a] 1,430	[a] 1,630	100,000
April	[a] 1,470	[a] 1,230	[a] 1,370	81,500
May	[a] 1,390	[a] 900	[a] 1,140	70,100
June	996	842	918	54,600
July	954	726	817	50,200
August	785	592	651	40,000
September	682	568	619	36,800
The year	9,200	498	1,350	978,000

[a] Estimated by comparison with flow of White Salmon River at Husum.

SANDY RIVER BASIN.

SANDY RIVER BELOW DAM, NEAR MARMOT, OREG.

LOCATION.—In NE. ¼ sec. 13, T. 2 S., R. 5 E., a quarter of a mile below diversion dam for Bull Run plant of Portland Railway, Light & Power Co., 1 mile southwest of Marmot, Clackamas County, and 9 miles east of Bull Run.

DRAINAGE AREA.—267 square miles at cable (measured on Mount Hood topographic map and on map of Oregon National Forest).

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RECORDS AVAILABLE.—December 22, 1915, to September 30, 1918. When discharge of Sandy River canal is added results are directly comparable with those at station above dam near Marmot, August 15, 1911, to December 21, 1915.

GAGE.—Stevens eight-day water-stage recorder on right bank since December 9, 1916; vertical staff in gage well on right bank October 16 to December 8, 1916, vertical staff on right abutment of dam near head gates of canal used prior to October 16, 1916, and during periods in 1918 when recorder was not operating. Friez water-stage recorder about 2½ miles above present station August 15, 1911, to December 21, 1915.

DISCHARGE MEASUREMENTS.—Made from cable just above backwater of dam (discharge of Sandy River canal deducted) or by wading near gage.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage 15.3 feet (recorder datum), as observed from high-water marks, and 39.0 feet as read on staff gage at dam at 9.30 p. m. December 18 (discharge, 22,800 second-feet; canal dry); minimum stage recorded, 0.27 foot September 17 (discharge, 4 second-feet); minimum discharge of river and canal combined, 302 second-feet November 1.

1911–1918: Maximum stage recorded same as for 1918. The stage of 38.4 feet at dam during night of December 21–22, 1915, determined from high-water marks the next morning, gives a discharge of 19,900 second-feet as recomputed on the basis of later measurements. Minimum stage recorded, 0.95 foot September 29 and 30, 1915, at station above dam (discharge, 285 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Sandy River canal of Portland Railway, Light & Power Co. takes out at dam. Its flow is included with that of river to give total run-off.

REGULATION.—The storage back of dam serves to lessen diurnal fluctuation caused by melting glaciers but has no effect for period of a day or more.

ACCURACY.—Stage-discharge relation changed December 18 and April 26. Three well-defined rating curves used as follows: October 1 to December 18, December 20 to April 15 and indirectly to April 25, and April 26 to September 30. Rating curve for dam gage fairly well defined by measurements to 8,500 second-feet, and by weir formula to maximum flood stage. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph, or, for days when there was considerable fluctuation, by averaging discharge determinations obtained by applying to rating table mean gage height for various subdivisions of the day, or, for days when recorder was not operating, by applying to rating table the mean daily gage height obtained from twice-dailv readings of gage at dam and by comparison with flow at Bull Run River. Records excellent except those of December, which are good.

Discharge measurements of Sandy River below dam, near Marmot, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 25	C. L. Batchelder	0.43	10.6	July 16	C. L. Batchelder	1.43	205
Dec. 20	F. F. Henshaw	8.02	7,500	22	Henshaw and Batchelder	1.12	95
29	do	8.35	8,590				
Mar. 20	Stewart and Henshaw	3.21	1,100	22	do	1.86	462
Apr. 10	C. L. Batchelder	3.57	1,500	Sept. 17	F. F. Henshaw	.27	[a] 4.0
May 16	do	3.63	1,690				

[a] Estimated.

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Daily discharge, in second-feet, of Sandy River below dam, near Marmot, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	27	10	2,140	3,820	1,700	1,080	1,630	1,320	1,040	236	112	12
2	18	8	1,370	3,040	1,620	1,040	1,380	1,320	930	390	124	12
3	56	9	1,190	3,020	1,620	1,070	1,180	1,490	895	210	154	12
4	61	13	1,220	4,400	1,740	1,000	1,040	1,670	860	173	38	12
5	12	10	1,250	3,550	3,160	930	1,000	1,510	895	197	32	12
6	12	17	1,620	3,160	5,270	860	930	1,390	965	163	25	12
7	11	9	1,340	4,100	4,740	825	930	1,280	965	112	19	12
8	11	8	995	4,100	3,040	790	965	1,240	895	152	12	12
9	11	9	895	3,550	2,360	825	1,220	1,240	825	200	14	12
10	13	9	895	2,920	2,060	860	1,460	1,180	895	152	24	13
11	14	10	920	4,600	2,160	860	1,420	1,070	965	134	59	5
12	22	173	5,120	7,700	2,060	895	1,380	1,040	895	109	16	5
13	9	454	11,600	4,250	1,960	860	1,340	1,070	895	100	12	5
14	10	165	9,600	4,100	1,780	790	1,180	1,210	895	95	12	60
15	10	42	5,840	3,820	1,660	790	1,180	1,320	720	124	12	40
16	11	30	4,600	3,960	1,660	930	1,340	1,710	603	183	11	8
17	11	18	10,600	3,550	1,620	1,000	1,620	1,590	596	222	11	4
18	11	10	14,800	3,420	1,540	1,380	1,540	1,470	564	262	14	4
19	11	14	19,800	2,920	1,420	1,380	1,500	1,550	544	179	31	4
20	10	9	8,340	2,360	1,220	1,180	1,660	1,670	551	77	14	4
21	9	9	4,710	2,060	1,100	1,100	1,780	1,750	570	67	11	4
22	9	9	6,060	1,870	1,040	1,420	1,960	1,550	584	196	12	4
23	9	9	6,430	1,740	1,040	1,620	1,700	1,390	570	243	22	4
24	9	9	3,960	2,200	1,000	1,620	1,700	1,280	558	163	21	4
25	12	9	3,040	4,620	895	1,960	1,580	1,210	551	144	17	4
26	10	9	5,100	2,920	1,140	1,960	1,430	1,100	465	231	17	4
27	9	12	6,740	2,360	1,000	1,780	1,350	1,070	405	144	14	4
28	9	491	9,800	2,260	1,160	1,700	1,160	1,040	290	90	14	4
29	9	2,540	8,000	2,800	.....	1,740	1,240	1,040	317	130	14	4
30	9	4,870	6,060	2,260	.....	1,960	1,240	1,100	205	95	13	5
31	9	.....	4,550	1,780	.....	1,870	.....	1,140	.....	106	12	.....

Monthly discharge of Sandy River below dam near Marmot, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	61	9	14.6	898
November	4,870	8	300	17,900
December	19,800	895	5,440	334,000
January	7,700	1,740	3,330	205,000
February	5,270	895	1,880	104,000
March	1,960	790	1,230	75,600
April	1,960	930	1,370	81,500
May	1,750	1,040	1,320	81,200
June	1,040	205	697	41,500
July	390	67	164	10,109
August	154	11	29.5	1,810
September	60	4	10	595
The year	19,800	4	1,320	954,000

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Combined daily discharge, in second-feet, of Sandy River and canal near Marmot, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	450	302	2,380	3,840	1,880	1,220	1,890	1,610	1,330	608	516	400
2	441	308	1,610	3,110	1,800	1,320	1,650	1,610	1,220	592	528	384
3	424	357	1,420	3,240	1,810	1,350	1,500	1,790	1,240	582	457	368
4	416	385	1,460	4,650	1,930	1,280	1,400	1,970	1,210	577	442	352
5	417	374	1,490	3,790	3,370	1,200	1,360	1,800	1,250	585	436	352
6	408	389	1,860	3,380	5,430	1,130	1,270	1,680	1,320	551	445	352
7	407	333	1,580	4,320	4,960	1,140	1,270	1,560	1,320	516	439	352
8	399	324	1,220	4,340	3,250	1,140	1,300	1,520	1,250	540	432	352
9	391	317	1,130	3,780	2,550	1,170	1,570	1,520	1,210	588	434	384
10	383	317	1,130	3,120	2,250	1,210	1,820	1,470	1,280	540	444	385
11	376	318	1,250	4,780	2,340	1,210	1,680	1,380	1,210	522	479	377
12	330	553	5,340	7,800	2,280	1,240	1,640	1,350	1,280	497	420	361
13	357	754	11,600	4,520	2,170	1,170	1,600	1,380	1,200	488	416	409
14	350	457	9,620	4,350	1,970	1,110	1,520	1,520	1,110	483	416	480
15	350	383	6,050	4,070	1,850	1,140	1,470	1,640	922	512	416	460
16	351	375	4,770	4,230	1,840	1,280	1,630	2,030	991	587	383	396
17	343	390	10,700	3,800	1,890	1,360	1,920	1,910	952	642	383	360
18	343	382	14,800	3,670	1,810	1,760	1,830	1,790	920	682	434	344
19	343	378	19,800	3,150	1,700	1,650	1,800	1,870	884	583	451	344
20	334	365	8,350	2,580	1,490	1,450	1,960	1,990	907	449	434	344
21	333	349	4,720	2,280	1,370	1,360	2,080	1,920	942	439	399	344
22	325	341	6,070	2,080	1,310	1,690	2,260	1,720	956	486	416	344
23	317	341	6,440	1,950	1,320	1,890	2,000	1,690	958	619	442	312
24	317	333	3,970	2,420	1,270	1,900	2,000	1,570	914	551	441	312
25	352	357	3,170	4,640	1,160	2,230	1,870	1,510	834	516	437	312
26	350	373	5,220	3,130	1,430	2,130	1,720	1,410	837	593	437	312
27	357	376	6,820	2,450	1,280	1,950	1,640	1,370	793	532	402	328
28	341	831	9,840	2,350	1,160	1,970	1,440	1,340	646	494	386	328
29	325	2,800	8,040	3,020	.....	2,010	1,530	1,340	689	477	386	344
30	317	5,020	6,060	2,450	.....	2,230	1,530	1,410	609	499	385	329
31	317	.....	4,570	1,960	.....	2,140	.....	1,440	.....	510	400	.....

Combined monthly discharge of Sandy River and canal near Marmot, Oreg., for the year ending Sept. 30, 1918.

[Drainage area, 267 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	450	317	363	1.36	1.57	22,300
November	5,020	302	629	2.36	2.63	37,400
December	19,800	1,130	5,560	20.8	23.98	342,000
January	7,800	1,950	3,520	13.2	15.22	216,000
February	5,430	1,160	2,100	7.87	8.20	117,000
March	2,230	1,100	1,520	5.69	6.56	93,500
April	2,260	1,270	1,670	6.25	6.97	99,400
May	2,030	1,340	1,620	6.07	7.00	99,600
June	1,330	609	1,040	3.90	4.35	61,900
July	682	439	543	2.03	2.34	33,400
August	528	383	430	1.61	1.86	26,400
September	480	312	361	1.35	1.51	21,500
The year	19,800	302	1,620	6.07	82.19	1,170,000

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LOST CREEK NEAR BRIGHTWOOD, OREG.

LOCATION.—In NE. ¼ sec. 25, T. 2 S., R. 7 E., 100 yards above mouth, 1 mile southeast of Truman's ranch, and 8 miles east of Brightwood, Clackamas County.

DRAINAGE AREA.—11.2 square miles (measured on topographic map).

RECORDS AVAILABLE.—September 17, 1913, to October 9, 1918, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder referred to a vertical staff on left bank; inspected by Carl Raithel and J. S. Malcomson.

DISCHARGE MEASUREMENTS.—Made from foot log or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; may shift in floods.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.32 feet at 7 p. m. December 18 (discharge, 1,610 second-feet); minimum stage recorded, 0.40 foot October 1, 1918 (discharge, 15 second-feet).

1913–1918: Maximum and minimum stages recorded same as for 1918; minimum discharge September 25, 1915, was equally low (gage height, 0.38 foot).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 12. Two rating curves, well defined below 450 second-feet were used, applicable respectively October 1 to December 11 and December 12 to September 30. Operation of water-stage recorder satisfactory except for breaks in October, November, and February. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting recorder graph, or, for days of considerable fluctuation, by averaging discharge of bi-hourly periods, or, for periods when recorder was not operating, by comparison with flow of Bull Run River. Records excellent except those of October, November, and February, which are good.

Discharge measurements of Lost Creek near Brightwood, Oreg., during the period Oct. 1, 1917, to Oct. 9, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 30	C. L. Batchelder	0.35	16.2	July 15	C. L. Batchelder	0.56	21.0
Dec. 16	F. F. Henshaw	2.23	325	Aug. 24	F. F. Henshaw	.50	20.1
May 17	C. L. Batchelder	1.36	112	Nov. 9	do	.89	41.6

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Daily discharge, in second-feet, of Lost Creek near Brightwood, Oreg., for the period Oct. 1, 1917, to Oct. 9, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	17	138	250	91	49	112	93	75	28	22	17	15
2	.....	17	93	188	84	50	94	106	67	27	21	17	15
3	18	17	77	235	89	50	85	130	74	27	19	17	16
4	.....	17	82	301		49	78	134	85	26	19	17	16
5	.....	19	87	247		45	75	108	98	26	19	16	22
6	.....	21	96	230		42	74	91	120	25	19	16	20
7	17	19	76	319		42	74	85	112	24	19	16	21
8	.....	19	61	289		43	84	84	98	24	19	16	18
9	.....	19	58	222		43	112	80	104	23	21	16	17
10	.....	19	56	175		41	120	74	108	23	21	16	.....
11	17	19	74	328	160	41	108	74	108	22	22	17	.....
12	.....	34	319	435		41	98	80	94	21	21	16	.....
13	.....	37	930	271		40	89	84	69	21	[b] 20	18	.....
14	.....	28	590	262		40	80	91	50	21	18	25	.....
15	.....	25	322	241		43	75	91	40	21	20	20	.....
16	.....	24	332	247		49	89	118	38	23	19	17	.....
17	17	24	834	247		62	94	112	41	26	19	16	.....
18	.....		1,020	228		89	91	104	38	26	25	16	.....
19	17		960	168		80	96	100	37	23	25	16	.....
20	.....		403	130	57	72	106	108	40	21	22	16	.....
21	.....	22	262	114	52	67	120	96	41	21	21	17	.....
22	.....		370	104	52	102	118	91	41	24	[b] 20	17	.....
23	.....		356	98	51	104	102	87	40	29	[b] 19	17	.....
24	.....		225	172	50	128	100	80	35	26	19	17	.....
25	.....	21	170	256	48	153	89	75	31	23	19	16	.....
26	.....	[a] 21	353	168	56	132	80	70	31	30	19	16	.....
27	.....	[a] 25	451	140	49	114	77	67	31	24	18	15	.....
28	.....		600	149	47	116	84	69	30	21	18	[b] 15	.....
29	.....	143	443	149	.....	128	91	89	29	21	17	[b] 15	.....
30	17		411	120	.....	144	93	110	29	20	17	[b] 15	.....
31	18	.....	316	98	.....	130	.....	96	.....	20	17	.....	.....

[a] Estimated. [b] Interpolated.

NOTE.—Braced figures show estimated mean discharge for periods indicated.

Monthly discharge of Lost Creek near Brightwood, Oreg., for the year ending Sept. 30, 1918.

[Drainage area, 11.2 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	.....	.....	17.3	1.54	1.78	1,060
November	.....	17	34.2	3.05	3.40	2,040
December	1,020	56	341	30.4	35.05	21,000
January	435	98	212	18.9	21.79	13,000
February	.....	47	117	10.4	10.83	6,500
March	144	40	75.1	6.71	7.74	4,620
April	120	74	92.9	8.29	9.25	5,530
May	134	67	92.8	8.29	9.56	5,710
June	120	29	61.1	5.46	6.09	3,640
July	30	20	23.8	2.12	2.44	1,460
August	25	17	19.8	1.77	2.04	1,220
September	25	15	16.7	1.49	1.66	994
The year	1,020	15	92.3	8.24	111.63	66,800

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SANDY RIVER CANAL NEAR MARMOT, OREG.

LOCATION.—In NE. ¼ sec. 13, T. 2 S., R. 5 E., 500 feet below headgate, 1 mile southwest of Marmot, and 9 miles east of Bull Run, Clackamas County.

RECORDS AVAILABLE.—December 22, 1915, to September 30, 1918.

GAGE.—Vertical staff in stilling well; datum even with bottom of canal; read by O. G. Olson. Gurley two-day water-stage recorder used July 24 to November 7, 1916.

DISCHARGE MEASUREMENTS.—Made from a footbridge near gage or by wading.

CHANNEL AND CONTROL.—Concrete-lined canal 13 feet wide on bottom, side slopes about 1 to 1. Control is at intake of first tunnel about 200 yards below gage, where there is a drop in grade.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.05 feet at 7.30 a. m. August 24 (discharge, 428 second-feet); canal dry at times.

1916–1918: Maximum stage recorded, 4.40 feet August 13 and 14, 1917 (discharge, 504 second-feet); canal dry at times.

ICE.—Stage-discharge relation never affected by ice.

ACCURACY.—Stage-discharge relation changed slightly April 4. Two well-defined rating curves used, applicable, respectively, October 1 to April 3 and April 4 to September 30. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Sandy River canal diverts water from Sandy River in NE. ¼ sec. 13, T. 2 S., R. 5 E., into a reservoir near Bull Run post office, from which it is drawn for the Bull Run hydroelectric plant of the Portland Railway, Light & Power Co. The tailrace of the power plant discharges into Bull Run River in NE. ¼ sec. 6, T. 2 S., R. 5 E.

Discharge measurements of Sandy River canal near Marmot, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 16	C. L. Batchelder	3.38	315	July 22	Batchelder and Henshaw	1.26	57
July 16	do	3.99	410	Sept. 17	F. F. Henshaw	3.48	344
22	Batchelder and Henshaw	3.74	384				

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Daily discharge, in second-feet, of Sandy River canal near Marmot, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	423	292	236	16	180	139	268	292	292	372	404	388
2	423	300	236	66	180	276	268	292	290	202	404	372
3	368	348	229	215	187	276	316	300	348	372	303	356
4	355	372	236	252	194	276	356	300	351	404	404	340
5	405	364	236	236	208	268	356	292	355	388	404	340
6	396	372	244	222	158	268	340	292	355	388	420	340
7	396	324	236	222	222	316	340	284	355	404	420	340
8	388	316	222	236	208	348	340	284	352	388	420	340
9	380	308	236	229	194	348	356	284	388	388	420	372
10	370	308	236	201	187	348	356	292	388	388	420	372
11	362	308	332	180	180	348	260	308	242	388	420	372
12	308	380	215	98	222	348	260	308	388	388	404	356
13	348	300	17	268	208	308	260	308	307	388	404	404
14	340	292	15	252	194	308	340	308	219	388	404	420
15	340	341	208	252	187	348	292	324	202	388	404	420
16	340	345	173	268	180	348	292	324	388	404	372	388
17	332	372	68	252	268	356	300	324	356	420	372	356
18	332	372	13	252	268	380	292	324	356	420	420	340
19	332	364	13	229	276	268	300	324	340	404	420	340
20	324	356	13	222	268	268	300	324	356	372	420	340
21	324	340	9	215	268	260	300	166	372	372	388	340
22	316	332	10	208	268	268	300	170	372	290	404	340
23	308	332	8	208	276	268	300	300	388	376	420	308
24	308	324	7	215	268	276	300	292	356	388	420	308
25	340	348	134	20	268	268	292	300	283	372	420	308
26	340	364	116	208	292	173	292	308	372	362	420	308
27	348	364	82	90	284	170	292	300	388	388	388	324
28	332	340	44	94	2	268	284	300	356	404	372	324
29	316	260	41	215	.....	268	292	300	372	347	372	340
30	308	148	18	194	.....	268	292	308	404	404	372	324
31	308	.....	7	180	.....	268	.....	300	.....	404	388	.....

Monthly discharge of Sandy River canal near Marmot, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	423	308	349	21,500
November	380	148	330	19,600
December	332	7	126	7,750
January	268	16	194	11,900
February	292	2	218	12,100
March	380	139	287	17,600
April	356	260	305	18,100
May	324	166	295	18,100
June	404	202	343	20,400
July	420	202	379	23,300
August	420	303	401	24,700
September	420	308	351	20,900
The year	423	2	298	216,000

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BULL RUN RIVER NEAR BULL RUN, OREG.

LOCATION.—In sec. 25, T. 1 S., R. 5 E., 1¼ miles above intake of Portland water-supply pipe line and 5 miles east of Bull Run, Clackamas County.

DRAINAGE AREA.—102 square miles.

RECORDS AVAILABLE.—August 20, 1907, to September 30, 1918; also readings on a gage of city water department, January 5, 1895, to November 13, 1906.

GAGE.—Friez water-stage recorder referred to vertical staff on left bank; datum raised 2.0 feet July 26, 1916. Prior to July 28, 1909, and during periods when recorder was not operating an inclined staff at headworks 1¼ miles below present gage was used. Observer, W. B. Wilson.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Rocks and gravel; shifting in extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage during year from high-water marks, 11.0 feet at 6 a. m. December 13 (discharge, 15,800 second-feet); minimum stage recorded, 0.36 foot September 29 and 30 (discharge, 69 second-feet).

1895–1918: Maximum and minimum stages same as for 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None above station. The two water-supply pipes divert practically all the low-water flow 1¼ miles below the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed February 6. Rating curve for 1917, well defined to 12,000 second-feet, was used prior to that date, and an equally well-defined curve thereafter. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or, in time of considerable fluctuation, by subdividing days, or, for periods when recorder was not operating, by estimation, using flood marks in combination with twice-daily gage readings at the headworks as a basis. Records excellent.

Discharge measurements of Bull Run River near Bull Run, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 24	C. L. Batchelder	0.78	122	Mar. 20	Stewart and Henshaw	1.94	724
Dec. 15	F. F. Henshaw	4.80	3,650	Apr. 9	C. L. Batchelder	2.30	927
29	James E. Stewart	5.55	4,850	July 14	do	.56	104
29	do	5.26	4,240	Aug. 27	F. F. Henshaw	.56	98
Feb. 6	Batchelder and Henshaw.	6.70	6,850	Sept. 24	do	.40	75
6	do	6.78	7,040				

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Daily discharge, in second-feet, of Bull Run River near Bull Run, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	125	94	1,480	2,360	725	482	1,110	608	382	132	107	87
2	118	94	1,100	1,540	630	445	736	644	350	130	109	83
3	114	195	1,260	2,420	795	448	626	694	328	128	107	83
4	114	180	1,480	3,200	1,180	430	560	708	324	125	105	81
5	111	164	1,180	2,220	2,810	388	524	662	324	125	105	79
6	104	183	1,480	1,740	4,700	354	485	578	332	125	103	79
7	104	142	1,100	2,810	3,060	336	495	512	324	120	103	79
8	102	128	802	2,420	1,780	360	530	542	310	118	101	79
9	102	118	830	1,630	1,270	367	960	620	306	115	103	79
10	100	116	774	1,180	1,270	345	1,030	536	306	111	125	79
11	100	114	2,000	2,420	1,580	345	855	490	286	109	140	81
12	100	596	6,480	3,620	1,400	345	820	475	266	107	115	81
13	98	539	12,900	2,220	1,150	336	722	455	252	107	107	87
14	96	320	7,430	3,000	960	345	701	614	235	107	103	118
15	96	257	3,920	3,340	785	368	662	890	221	107	103	95
16	94	214	3,920	3,620	820	420	1,030	1,230	210	105	103	83
17	94	195	9,500	2,740	750	536	1,070	1,000	204	103	103	79
18	94	183	11,400	2,480	650	1,000	925	1,000	194	103	118	75
19	92	169	10,300	1,740	572	820	1,000	1,270	182	103	135	75
20	90	158	4,700	1,180	500	708	1,110	1,000	179	103	115	74
21	90	150	2,030	900	458	694	1,360	925	173	101	107	74
22	88	142	3,770	760	423	1,190	1,110	785	164	101	111	74
23	88	138	3,340	690	460	1,230	925	662	164	204	113	75
24	107	138	1,790	1,480	465	1,320	855	608	161	152	107	75
25	107	145	1,260	2,420	430	1,580	736	506	155	122	101	74
26	107	135	3,340	1,340	548	1,400	650	470	149	164	99	72
27	114	207	4,070	1,140	470	1,230	620	435	143	152	95	70
28	109	734	8,450	1,530	520	1,320	632	410	138	132	93	70
29	100	2,710	5,040	1,680	.....	1,270	644	396	135	120	91	69
30	98	2,740	3,700	1,180	.....	1,320	620	425	135	113	89	69
31	98	.....	3,000	865	.....	1,110	.....	420	.....	109	87	.....

Monthly discharge of Bull Run River near Bull Run, Oreg., for the year ending Sept. 30, 1918.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	125	88	102	1.00	1.15	6,270
November	2,740	94	380	3.73	4.16	22,600
December	12,900	774	3,990	39.1	45.08	245,000
January	3,620	690	2,000	19.6	22.60	123,000
February	4,700	423	1,110	10.9	11.35	61,600
March	1,580	336	737	7.23	8.34	45,300
April	1,360	485	803	7.87	8.78	47,800
May	1,270	396	664	6.51	7.50	40,800
June	382	135	234	2.29	2.56	13,900
July	204	101	121	1.19	1.37	7,440
August	140	87	107	1.05	1.21	6,580
September	118	69	79.3	.777	.87	4,720
The year	12,900	69	864	8.47	114.97	625,000

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LITTLE SANDY RIVER NEAR MARMOT, OREG.

LOCATION.—In SW. ¼ sec. 6, T. 2 S., R. 6 E., at trail bridge at Little Sandy ranger station, 1½ miles north of Marmot, Clackamas County.

DRAINAGE AREA.—17.2 square miles (measured on topographic map).

RECORDS AVAILABLE.—August 14, 1913, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder referred to vertical staff on left bank just below bridge; inspected by Carl Aschoff.

DISCHARGE MEASUREMENTS.—Made from trail bridge or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; may shift somewhat.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 4.56 feet at 9 p. m. December 18 (discharge, 1,710 second-feet); minimum stage recorded, 0.23 foot September 27 and 30 (discharge, 14 second-feet).

1913–1918: Maximum stage from water-stage recorder same as for 1918; minimum stage recorded, 0.21 foot August 28, 1914 (discharge, 12 second-feet).

ICE.—Stage-discharge relation never affected by ice.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 800 second-feet, except at extreme low water. Operation of water-stage recorder satisfactory except for short periods when sand collected in well. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or, for days of large fluctuation, by subdividing days, except as indicated in footnote to table of daily discharge. Records good.

Discharge measurements of Little Sandy River near Marmot, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 9	C. L. Batchelder	1.75	203	July 14[a]	C. L. Batchelder	.31	20.4
Apr. 10	do	1.66	168	15	do	.31	18.9
May 17	do	1.82	222	Sept. 18[a]	F. F. Henshaw	.24	9.4

[a] Measurement somewhat in error on account of low velocities.

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Daily discharge, in second-feet, of Little Sandy River near Marmot, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	22	16	265	318	145	82	167	135	145	19	17	16
2	20	15	178	237	135	78	135	156	135		17	16
3	20	26	178	305	167	76	114	167	116		16	16
4	19	29	224	430	200	71	99	178	101		16	15
5	18	28	200	335	318	68	93	156	91		16	15
6	18	35	300	300	615	64	86	135	85		16	15
7	18	24	224	410	472	63	88	114	80		16	15
8	17	22	167	430	282	63	94	135	78	18	16	15
9	17	20	178	318	212	61	167	135	71		17	15
10	17	19	167	224	212	61	178	120	63		22	15
11	17	19	236	596	237	62	156	107	60		23	15
12	16	101	800	690	200	63	145	107	58		19	15
13	16	149	1,280	370	178	61	135	105	54		18	16
14	16	66	855	450	156	59	118	135	48	16	17	19
15	15	47	450	495	135	60	107	251	45	16	18	17
16	15	37	450	518	125	[a] 70	167	282	42	16	18	16
17	15	32	983	410	121	84	200	212	40	16	18	15
18	15	29	1,130	352	109		167	200	38	16	23	14
19	15	26	1,350	251	97		178	224	36	17	26	14
20	15	25	640	200	85	150	200	251	35	16	22	14
21	15	24	390	167	79		224	200	32	16	20	14
22	15	23	450	145	75	224	212	189	30	16	22	14
23	15	22	450	135	78	189	167	178	28	35	22	14
24	19	22	282	406	73	212	178	167	28	30	20	14
25	20	26	224	450	70	265	145	156	28	22	19	14
26	20	24	377	265	107	251	125	152	26	32	[a] 18	14
27	23	53	468	237	90	212	125	148	24	26	17	14
28	21	181	855	300	84	237	135	145	23	21	17	14
29	18	414	640	300	.....	224	145	135	21	19	17	14
30	17	540	565	224	.....	224	135	135	20	18	17	14
31	16	.....	410	189	.....	200	.....	135	.....	18	16	.....

[a] Interpolated.

NOTE.—Braced figures show mean discharge for periods indicated; estimated by comparison with flow of Bull Run River.

Monthly discharge of Little Sandy River near Marmot, Oreg., for the year ending Sept. 30, 1918.

[Drainage area, 17.2 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	23	15	17.4	1.01	1.16	1,070
November	540	15	69.8	4.06	4.53	4,150
December	1,350	167	496	28.8	33.20	30,500
January	690	135	337	19.6	22.60	20,700
February	615	70	173	10.1	10.52	9,610
March	265	59	129	7.50	8.65	7,930
April	224	86	146	8.49	9.47	8,690
May	282	105	163	9.48	10.93	10,000
June	145	20	56.0	3.26	3.64	3,330
July	35	16	19.4	1.13	1.30	1,190
August	26	16	18.6	1.08	1.24	1,140
September	19	14	14.9	.866	.97	887
The year	1,350	14	137	7.97	108.21	99,200

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WILLAMETTE RIVER BASIN.

WILLAMETTE RIVER AT ALBANY, OREG.

LOCATION.—In SW. ¼ sec. 6, T. 11 S., R. 3 W., at end of Broadalbin Street, Albany, Linn County, half a mile above Southern Pacific Railroad bridge (formerly Corvallis & Eastern) just below mouth of Calapooya Creek and 9 miles by river above Santiam River.

DRAINAGE AREA.—4,860 square miles.

RECORDS AVAILABLE.—November 24, 1878, to April 30, 1882; January 21, 1892, to September 30, 1918; fragmentary records 1883 to 1888.

GAGE.—Vertical staff in two sections on right bank.

DISCHARGE MEASUREMENTS.—Made from Southern Pacific bridge.

CHANNEL AND CONTROL.—Sand and fine gravel; practically permanent. Above gage height 17 feet some water flows through a slough several hundred feet to left of main channel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.5 feet at noon December 25 (discharge, 91,200 second-feet); minimum stage recorded, 0.5 foot September 29 and 30 (discharge, 2,470 second-feet.)

1878–1882 and 1892–1918: Maximum stage recorded, 32.8 feet January 14, 1881 (discharge, 245,000 second-feet); minimum stage recorded, 0.2 foot September 21 to 27, 1879 (discharge, 1,870 second-feet), but this is somewhat uncertain. Lowest stages recorded in recent years are 0.4 foot October 30 to November 10, 1895 (discharge, 2,220 second-feet), and 0.5 foot August 26 to September 25, 1905, and September 5 to 14, and October 13–15, 20–22, 1915 (discharge, 2,400 second-feet). The highest stage ever known was 36.0 feet December 8, 1861 (discharge estimated from extension of rating curve, 302,000 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Albany power canal has diverted water from South Santiam River near Lebanon and discharged into Willamette River above the gage and measuring section since the early nineties. It ordinarily carries between 200 and 250 second-feet. Records for run-off per square mile and depth in inches published in Water-Supply Papers 370, 312, 332, 363, and 394 are in error.

REGULATION.—Practically none.

ACCURACY.—Stage-discharge relation changed since last medium-stage discharge measurements; it was assumed that this change occurred on October 1. New rating curve fairly well defined. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

Discharge measurements of Willamette River at Albany, Oreg., during the year ending Sept. 30, 1918.

[Made by C. L. Batchelder.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Dec. 21	16.9	68,300
June 10	2.55	7,130

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Daily discharge, in second-feet, of Willamette River at Albany, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,420	3,030	34,800	35,700	24,000	19,200	20,000	11,500	7,000	4,270	3,620	3,220
2	3,420	3,030	45,200	28,500	22,000	17,500	19,200	10,900	7,000	4,270	3,620	3,220
3	3,420	3,030	29,400	23,600	23,600	17,500	17,200	10,300	7,000	4,270	3,620	3,030
4	3,420	3,030	18,600	24,400	23,600	18,900	15,500	9,950	7,000	4,050	3,420	3,030
5	3,420	3,030	15,100	32,100	30,800	20,000	14,100	10,900	6,740	4,050	3,420	3,030
6	3,220	3,620	12,500	31,600	43,800	17,900	13,100	11,200	6,740	4,050	3,420	3,030
7	3,220	4,270	10,900	27,600	59,500	16,500	12,500	11,200	6,740	4,050	3,420	3,030
8	3,220	4,050	10,300	29,000	70,700	15,500	11,800	10,900	7,000	4,050	3,420	3,030
9	3,220	3,620	9,050	31,200	60,500	14,500	12,100	10,600	7,280	3,830	3,220	2,840
10	3,220	3,220	8,450	33,900	42,900	15,500	12,100	10,300	7,000	3,830	3,220	2,840
11	3,220	3,220	6,740	29,800	33,900	19,600	11,500	9,950	7,000	3,830	3,220	2,840
12	3,220	3,420	7,000	36,200	29,800	24,000	13,100	9,650	6,740	3,830	3,220	2,840
13	3,220	3,620	8,150	62,000	29,000	22,000	11,500	9,050	6,740	3,830	3,220	2,840
14	3,030	3,830	18,200	87,500	34,400	20,800	13,100	8,750	6,740	3,830	3,220	2,840
15	3,030	3,830	35,200	71,200	34,800	19,600	12,500	8,750	6,480	3,830	3,220	2,840
16	3,030	3,420	35,700	71,200	32,600	17,200	12,500	8,450	6,480	3,830	3,220	3,030
17	3,030	3,420	30,300	67,400	36,200	17,200	12,100	8,750	6,480	3,830	3,220	3,030
18	3,030	3,220	37,000	60,000	42,400	18,600	12,100	8,750	6,480	3,830	3,420	2,840
19	3,030	3,220	58,000	55,500	38,800	21,200	12,100	8,750	5,960	3,830	3,420	2,840
20	3,030	3,220	69,600	50,600	31,600	22,000	12,100	9,050	5,710	3,620	3,420	2,840
21	3,030	3,220	68,500	41,100	26,000	19,200	12,100	8,750	5,460	3,620	3,220	2,840
22	3,030	3,230	53,500	36,200	22,400	18,200	12,100	8,450	4,970	3,620	3,220	2,650
23	3,030	3,030	41,600	27,600	19,600	20,400	13,400	8,150	4,730	3,620	3,220	2,650
24	3,030	3,030	60,500	23,200	20,400	25,200	13,400	7,850	4,500	3,620	3,220	2,650
25	3,030	3,030	89,000	25,200	23,200	25,600	13,400	7,560	4,500	3,620	3,220	2,650
26	3,030	3,030	80,300	23,600	20,800	26,400	12,800	7,280	4,500	3,830	3,220	2,650
27	3,030	3,030	64,100	22,400	20,000	26,800	12,500	7,280	4,500	3,830	3,220	2,650
28	3,030	3,220	62,000	21,200	20,000	24,000	11,800	7,000	4,500	3,830	3,220	2,650
29	3,030	4,050	60,000	20,400	.....	21,200	11,500	7,000	4,500	3,620	3,220	2,470
30	3,030	10,900	55,500	24,000	.....	19,600	11,500	7,000	4,500	3,620	3,220	2,470
31	3,030	.....	45,600	24,000	.....	19,600	.....	7,000	.....	3,620	3,220	.....

Monthly discharge of Willamette River at Albany, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	3,420	3,030	3,140	193,000
November	10,900	3,030	3,600	214,000
December	89,000	6,740	38,100	2,340,000
January	87,500	20,400	38,000	2,340,000
February	70,700	19,600	32,800	1,820,000
March	26,800	14,500	20,000	1,230,000
April	20,000	11,500	13,200	786,000
May	11,500	7,000	9,060	557,000
June	7,280	4,500	6,030	359,000
July	4,270	3,620	3,850	237,000
August	3,620	3,220	3,310	204,000
September	3,220	2,470	2,850	170,000
The year	89,000	2,470	14,400	10,400,000

SALMON CREEK NEAR OAKRIDGE, OREG.

LOCATION.—In NW. ¼ sec. 13, T. 21 S., R. 3 E., 1 mile above Flat Creek ranger station, 1½ miles above old inclined gage near Southern Pacific Railroad bridge, and 3 miles above Oakridge, Lane County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 6, 1913, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank about a mile above railroad bridge used since October 1, 1914. Vertical staff on right bank 500 feet above railroad bridge used February 6 to November 21, 1913. Inclined staff on right bank 200 feet above railroad bridge used November 22, 1913, to September 30, 1914; observer, Mrs. J. W. Michael.

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DISCHARGE MEASUREMENTS.—Made from railroad bridge 1½ miles below gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; may shift during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.35 feet at 6 a. m. January 12 (discharge, estimated from extension of rating curve, 6,400 second-feet); minimum stage recorded, 0.41 foot September 25 (discharge, 112 second-feet); minimum discharge estimated as 110 second-feet earlier in September.

1913–1918: Maximum stage recorded, probably same as for 1918; minimum stage recorded, 0.23 foot October 30, 1915 (discharge, 98 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed June 17, affecting only low stages. Two fairly well defined rating curves used October 1 to June 12 and June 17 to September 30. Operation of water-stage recorder generally unsatisfactory, due largely to incorrect setting of pencil by observer. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder-graph, except for periods when recorder was not operating for which it was ascertained by comparison with flow of Clackamas River. Records fair.

Discharge measurements of Salmon Creek near Oakridge, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 10	C. L. Batchelder	1.32	419	Aug. 14	M. L. Bugbee [a]	0.55	137
Aug. 5	M. L. Bugbee [a]	.58	145				

[a] Engineer, Waldo Lake Irrigation & Power Co.

Daily discharge, in second-feet, of Salmon Creek near Oakridge, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	157	130	450	740	650	440	930	580	410	180	148	
2	154	128		650	610	470	830	610	410	178	150	
3	151	160	325	780	580	500	740	740	410	175	148	
4	148	142	[a] 300	1,100	690	500	650	780	470	178	150	
5	145	178	[a] 250	1,040	1,040	470	650	740	540	180	148	
6	145	151	234	980	2,130	440	580	610	540	182	148	
7	148	135	218		1,650	440	580	580	500	188	148	
8	151	130	200	960	1,240	440	540	540	440	190	146	110
9	148	122	192		1,040	440	580	540	470	191	143	
10	145	120	186	930	930	440	650	470	410	175	143	
11	145		175	1,560	880	470	650	440	410	188	141	
12	148		265	2,800	880	500	610	440	392		139	
13	148		830		780	540	610	440		170	137	
14	145	120	980		740	470	540	470			137	
15	145		830		650	470	500	500	325	165	150	
16	140		740	2,130	650	470	540	500		162	182	
17	138		1,100		690	540	580	500	265	162	150	
18	135	114	1,170		610	830	580	470	265	162	152	115
19	138		1,100		580	880	580	470	254	160	148	
20	138		1,100	1,170	540	880	610	440	240	158	143	
21	138		880	1,040	470	740	780	410	237	158	146	
22	135		980	880	440	690	880	386	234	160	139	119
23	138	110	2,340	830	440	830	830	386	221	182	139	[a] 116
24	138		2,030		440	830	780	368	[a] 214	192	137	[a] 114
25	135		1,480		470	980	780	362	206	178	135	112
26	135		1,400	850	500	980	690	350	203	172	130	
27	138		1,240		470	880	610	340	198	168	126	116
28	135		1,170		440	830	540	335	192	160	124	
29	132	400	1,040		.....	830	580	350	188	152	119	
30	132		930	780	.....	930	580	398	182	150	112	119
31	130	.....	830	740	.....	980	.....	410	.....	150	110	.....

[a] Interpolated.

NOTE.—Braced figures show estimated mean discharge for periods indicated.

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Monthly discharge of Salmon Creek near Oakridge, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	157	130	142	8,730
November	.....	.....	151	8,980
December	2,340	175	820	50,400
January	.....	650	1,260	77,500
February	2,130	440	758	42,100
March	980	440	649	39,900
April	930	500	653	38,900
May	789	335	482	29,600
June	540	182	327	19,500
July	192	150	171	10,500
August	152	110	140	8,610
September	.....	.....	113	6,720
The year	.....	.....	471	341,000

McKENZIE RIVER AT McKENZIE BRIDGE, OREG.

LOCATION.—In sec. 14, T. 16 S., R. 6 E., at highway bridge at McKenzie Bridge, Lane County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 8, 1910, to September 30, 1916; April 1, 1917, to September 30, 1918.

GAGE.—Vertical staff attached to right abutment of highway bridge at McKenzie Bridge; old staff washed out December 16, 1917, and a new staff was established March 12, 1918, at different datum; read by S. L. Taylor. Another gage, which was formerly read, is at Hayes ranch, half a mile above McKenzie Bridge; and a third is on left bank at Paradise ranger station about 2 miles above bridge.

DISCHARGE MEASUREMENTS.—Made from cable three-eighths of a mile above the ranger station.

CHANNEL AND CONTROL.—Rocky; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.2 feet November 30 (discharge, 4,260 second-feet); stage may have gone higher after gage was washed out December 16; minimum stage recorded, 0.44 foot September 24 to 29 (discharge, 1,140 second-feet).

1910–1918: Maximum stage recorded, 5.0 feet on gage at highway bridge, January 13, 1912 (discharge, 7,400 second-feet); minimum stage recorded, 1.42 feet November 7, 1915 (discharge, 924 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed March 12 on account of change in gage datum; otherwise practically permanent. Two well-defined rating curves used, one applicable to each datum. Gage read once to hundredths nearly every day. Daily discharge ascertained by applying daily gage height to rating table, except for periods when gage was not read, for which it was ascertained by estimation and interpolation. Records good.

COOPERATION.—Gage records furnished by United States Forest Service, C. R. Seitz, supervisor.

The following measurement was made by R. C. Briggs:

March 12: Gage height, 1.18 feet; discharge, 1,700 second-feet.

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Daily discharge, in second-feet, of McKenzie River at McKenzie Bridge, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1,260	2,160	.....	.....	.....	2,210	1,900	1,630	1,390	[a]1,330	1,180
2	.....	1,260	1,760	.....	.....	.....	2,100	2,000	1,630	1,390	1,320	1,180
3	.....	1,260	[a]1,670	.....	.....	.....	2,100	2,000	1,630	1,390	1,320	1,180
4	.....	1,260	1,580	.....	.....	.....	2,000	2,100	1,630	1,390	1,320	1,180
5	.....	[a]1,260		.....	.....	.....	1,900	2,000	[a]1,630	1,390	1,320	1,180
6	.....	1,260	1,580	.....	.....	.....	1,900		[a]1,630	1,390	1,250	1,180
7	.....	[a]1,260		.....	.....	.....	1,900		1,630	[a]1,390	1,250	1,180
8	.....	1,260		.....	.....	.....	1,900		1,630	[a]1,390	[a]1,250	1,180
9	.....	1,260		.....	.....	.....	2,000	1,900	1,630	1,390	1,250	1,180
10	.....	1,260	1,580	.....	.....	.....	[a]2,000		1,540	[a]1,390	1,250	[a]1,180
11	.....	1,260	1,580	.....	.....	.....	2,000			1,390		[a]1,180
12	.....	1,260	1,670	.....	.....	1,720	2,000			1,390	1,250	1,180
13	.....	[a]1,260	3,150	.....	.....	1,720	2,000	1,810		1,390		[a]1,180
14	.....	1,260	3,450	.....	.....	1,720	1,900	[a]1,810	1,500	[a]1,390	1,250	[a]1,180
15	.....	1,260	3,300	.....	.....	1,630	1,900	1,810		1,390	1,250	1,180
16	.....	1,260	.....	.....	.....	1,630	1,900	1,810		[a]1,360	1,250	1,180
17	1,340	1,260	.....	.....	.....	[a]1,760	1,900	1,810	1,460	1,320	1,250	1,180
18	1,340	1,260	.....	.....	.....	1,900	1,900	1,810	1,460	[a]1,320	1,250	[a]1,180
19	1,340	1,260	.....	.....	.....	[a]1,900	1,900	1,720	1,460	1,320	1,250	1,180
20	1,260	1,190	.....	.....	.....	[a]1,860	[a]1,950	1,720	1,460	1,320	1,250	1,140
21		1,190	.....	.....	.....	1,810	2,000	[a]1,720	[a]1,460	1,320		[a]1,140
22		[a]1,190	.....	.....	.....	1,900	2,100	1,720	[a]1,460	1,320	1,250	[a]1,140
23	1,260	[a]1,190	.....	.....	.....	2,210	2,100	1,720	1,460	1,320		1,140
24		1,190	.....	.....	.....	2,210	2,100	[a]1,680		1,320	1,250	1,140
25		1,190	.....	.....	.....	2,430	[a]2,050	1,630	1,460	1,320	1,250	1,140
26	1,260	1,190	.....	.....	.....	[a]2,320	2,000	1,630		1,320	1,180	1,140
27	[a]1,260	1,190	.....	.....	.....	[a]2,210	[a]2,000	1,630	1,390	1,320	1,180	1,140
28	[a]1,260	1,420	.....	.....	.....	2,100	[a]1,900	[a]1,630	1,390	[a]1,320	1,180	1,140
29	1,260	1,500	.....	.....	.....	2,210	1,900	1,630	[a]1,390	1,320	[a]1,180	1,140
30	1,260	4,260	.....	.....	.....	2,320	1,900	1,630	1,390	1,320	1,180	[a]1,140
31	1,260	.....	.....	.....	.....	2,320	.....	1,630	.....	[a]1,320	[a]1,180	.....

[a] Interpolated.

NOTE.—Braced figures show estimated mean discharge for periods indicated.

Monthly discharge of McKenzie River at McKenzie Bridge, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 17-31	1,340	1,260	1,280	38,100
November	4,260	1,190	1,350	80,300
December 1-15	3,450	1,580	1,990	59,200
March 12-31	2,430	1,630	1,990	78,400
April	2,210	1,900	1,960	118,000
May	2,100	1,630	1,800	111,000
June	1,630	1,390	1,510	89,800
July	1,390	1,320	1,360	83,600
August	1,320	1,180	1,250	76,900
September	1,180	1,140	1,170	69,600

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NORTH SANTIAM RIVER AT NIAGARA, OREG.

LOCATION.—In sec. 29, T. 9 S., R. 4 E., just below Badbanks Creek, half a mile below Niagara, Marion County, and 15 miles below Breitenbush Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 21, 1908, to November 17, 1910; June 7, 1911, to September 30, 1918.

GAGE.—Vertical staff in two sections (0 to 6 feet and 6 to 14 feet) on right bank, about 200 feet below the mouth of Badbanks Creek; read by H. D. Bondy.

DISCHARGE MEASUREMENTS.—Made from cable 75 feet above gage. Prior to 1913 made from a boat.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Control of huge boulders 50 feet below gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.7 feet December 19 (discharge, 37,200 second-feet) river may have reached higher stage during night; minimum stage recorded, 1.4 feet September 26 to 30 (discharge, 520 second-feet).

1908–1918: Maximum stage (determined from high-water mark), 16.4 feet about 1 p. m. November 22, 1909 (discharge, 63,200 second-feet); minimum stage, 1.25 feet September 23 to 25, 1915 (discharge, 430 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None above station. The Salem power canal diverts water near Stayton.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 400 and 2,000 second-feet and fairly well defined above 2,000 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except during December and September for which they are fair.

Discharge measurements of North Santiam River at Niagara, Oreg., during the year ending Sept. 30, 1918.

[Made by C. L. Batchelder.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Dec. 18	9.90	20,400
19	12.25	35,000

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Daily discharge, in second-feet, of North Santiam River at Niagara, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	720	580	4,800	5,000	2,600	1,560	3,880	2,740	1,920	970	720	650
2	720	580	4,240	4,240	2,600	1,560	3,360	2,740	1,680	970	720	650
3	720	580	4,060	5,000	2,740	1,680	2,880	3,040	1,680	880	720	630
4	720	615	3,700	6,680	2,880	1,680	2,600	2,880	1,800	880	650	580
5	720	580	3,520	6,460	7,120	1,800	2,460	3,040	2,040	880	650	570
6	720	615	3,520	6,240	13,000	1,800	2,180	2,740	2,180	800	680	580
7	720	580	3,360	6,020	7,580	1,800	2,180	2,460	2,040	800	650	580
8	720	580	3,200	5,400	5,800	1,680	2,320	2,320	2,040	800	650	580
9	685	580	2,880	4,600	5,400	1,560	2,740	2,180	1,920	800	680	580
10	685	580	2,740	3,880	4,800	1,560	3,200	2,040	2,040	800	650	580
11	685	615	2,740	7,120	4,240	1,560	3,200	1,920	1,920	800	650	580
12	650	650	3,520	10,600	3,700	1,680	2,740	1,920	1,920	800	650	580
13	650	685	11,200	7,120	3,200	[a]1,620	2,600	2,040	1,800	800	650	580
14	615	650	10,600	6,900	2,880	1,560	2,460	2,180	1,680	800	680	580
15	615	580	9,020	7,340	2,600	1,560	2,320	2,320	1,680	800	650	580
16	615	580	9,750	6,240	2,880	1,560	2,460	2,180	1,560	800	650	580
17	615	580	20,500	6,460	2,740	1,920	2,460	2,320	1,560	800	720	580
18	615	580	25,800	7,580	2,460	2,880	2,460	2,320	1,350	800	720	580
19	615	580	34,200	6,240	2,180	2,880	2,460	2,320	1,250	720	720	580
20	615	580	24,600	5,400	2,040	3,040	2,740	2,180	1,350	720	720	580
21	615	580	8,060	4,240	1,920	3,200	3,360	2,040	1,250	720	720	580
22	615	580		3,360	1,920	5,200	3,520	2,040	1,250	720	720	580
23	615	580		3,200	1,920	4,600	3,360	1,920	1,250	800	650	580
24	650	550		3,040	1,800	4,600	3,200	1,800	1,150	970	650	580
25	650	580		3,040	1,800	4,240	3,040	1,680	1,150	800	650	580
26	615	580	8,000	3,360	1,800	3,880	2,740	1,680	1,060	800	650	520
27	615	650		3,520	1,800	3,880	2,460	1,560	1,060	800	650	520
28	615	1,450		3,360	1,680	3,700	2,460	1,560	970	800	650	520
29	615	4,600		3,200	.....	3,520	2,600	1,450	970	800	650	520
30	580	10,600		3,040	.....	3,700	2,600	1,800	970	800	650	520
31	580	.....		2,740	.....	3,700	.....	1,920	.....	800	580	.....

[a] Interpolated.

NOTE.—Braced figure shows estimated mean discharge for period indicated.

Monthly discharge of North Santiam River at Niagara, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	720	580	651	40,000
November	10,600	550	1,090	64,900
December	34,200	2,740	8,900	547,000
January	10,600	2,740	5,180	319,000
February	13,000	1,680	3,500	194,000
March	5,200	1,560	2,630	161,000
April	3,880	2,180	2,770	165,000
May	3,040	1,450	2,170	133,000
June	2,180	970	1,550	92,200
July	970	720	814	50,100
August	720	580	668	41,100
September	650	520	577	34,300
The year	34,200	520	2,540	1,840,000

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CLACKAMAS RIVER NEAR CAZADERO, OREG.

LOCATION.—In NE. ¼ sec. 11, T. 4 S., R. 4 E., a short distance above backwater from Cazadero dam of Portland Railway, Light & Power Co. and 3 miles southeast of Cazadero, Clackamas County.

DRAINAGE AREA.—685 square miles.

RECORDS AVAILABLE.—January 1, 1909, to September 30, 1918.

GAGE.—Friez water-stage recorder referred to a vertical staff on right bank; inspected by employees of Portland Railway, Light & Power Co. During intervals of missing record, discharge was based on gage at River mill dam 6 miles below, and Weather Bureau gage, below North Fork, 5 miles above station.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet below gage.

CHANNEL AND CONTROL.—Bed composed of rocks and gravel; shifting in extreme floods. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 95.2 feet at forebay staff, above River mill dam, 11 a. m. to 1 p. m. December 19 (discharge, 44,800 second-feet); minimum stage from water-stage recorder, 25.07 feet, September 29 and 30 (discharge, 759 second-feet).

1909–1918: Maximum stage recorded, 43.7 feet at 1 p. m. November 22, 1909 (discharge, 46,800 second-feet); minimum discharge of 705 second-feet occurred September 21 to 23 and October 8 to 10, 1915, at a stage of 25.7 feet.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation shifted during flood of December, 1917. Two well-defined rating curves for regular gage used October 1 to December 10, and March 17 to September 30. Operation of recorder satisfactory during these periods. Daily discharge obtained by applying to rating curve mean daily gage height obtained by inspection of recorder graph. From December 11 to March 16, when recorder was washed out, low-stage discharge from December 9 to 12 and February 16 to March 16 was based on Weather Bureau gage; flood discharge from December 13 to February 15 was based on hourly readings at River mill dam. Records from December to March good, and excellent for remainder of year.

Discharge measurements of Clackamas River near Cazadero, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	Frank Ewing [a]	25.93	945	June 26	F. G. Robley	26.65	1,230
25	do	25.85	950	July 3	do	25.50	1,120
Apr. 19	Batchelder and Robley	27.35	2,990	Aug. 8	do	25.30	940
June 3	Ewing and Robley	26.45	1,900	29	do	25.20	855
15	F. G. Robley [a]	26.00	1,590	Sept. 23	do	25.10	788

[a] Employee of Portland Railway, Light & Power Co.

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Daily discharge, in second-feet, of Clackamas River near Cazadero, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,020	926	4,480	7,580	4,100	2,480	4,740	3,180	2,100	1,160	972	860
2	1,010	910	3,050	6,880	2,840	2,480	4,220	3,310	2,000	1,160	960	853
3	1,010	990	2,480	6,120	3,190	2,480	3,570	3,570	1,950	1,110	948	860
4	1,000	1,080	2,420	6,750	3,970	2,480	3,310	3,960	1,900	1,110	940	852
5	990	1,030	2,320	5,550	8,080	2,350	2,940	3,830	2,000	1,110	940	844
6	990	1,050	2,370	5,090	11,600	2,350	2,820	3,310	2,150	1,110	940	836
7	982	974	2,150	5,990	16,500	2,000	2,820	3,060	2,150	1,060	940	836
8	982	950	1,890	6,230	10,200	2,000	2,820	3,060	2,000	1,060	940	820
9	982	934	1,740	6,180	7,200	2,230	4,480	2,940	1,950	1,060	940	820
10	982	926	1,570	5,800	5,600	3,000	4,350	2,700	1,900	1,060	940	830
11	974	910	1,640	7,570	5,810	2,480	3,960	2,470	1,800	1,020	940	830
12	966	1,080	4,780	16,500	4,850	2,480	3,700	2,470	1,750	1,020	940	830
13	966	1,290	11,400	12,300	4,850	2,230	3,440	2,580	1,700	1,020	900	830
14	966	1,070	15,200	9,400	5,040	2,230	3,310	2,940	1,600	1,020	900	844
15	966	1,020	12,000	9,860	4,070	2,230	2,940	2,940	1,560	1,020	940	860
16	958	990	8,820	8,920	3,800	2,000	2,940	3,060	1,520	1,020	900	836
17	950	974	18,200	8,840	3,800	2,820	3,060	2,940	1,420	1,020	940	812
18	950	958	29,100	8,300	3,520	3,960	2,940	2,820	1,340	968	940	804
19	950	950	40,500	8,920	3,520	3,700	3,060	2,820	1,380	988	980	796
20	950	942	20,300	5,670	3,000	3,310	3,310	2,820	1,340	980	972	788
21	942	942	11,260	5,040	2,740	3,180	3,830	2,700	1,340	956	948	788
22	942	934	10,900	4,330	2,610	4,740	4,220	2,580	1,290	980	924	780
23	942	918	14,300	4,640	2,610	5,650	4,090	2,470	1,290	1,160	908	773
24	942	910	11,900	3,310	2,610	5,390	3,960	2,360	1,290	1,200	884	773
25	950	910	7,900	7,890	2,480	5,910	3,700	2,200	1,290	1,060	876	773
26	958	910	11,900	5,690	3,260	5,780	3,440	2,100	1,240	1,110	868	766
27	966	1,010	16,200	5,250	2,480	5,130	3,180	2,050	a1,200	1,060	860	766
28	934	1,740	16,000	5,710	2,460	4,740	3,060	2,000	a1,200	1,020	860	766
29	934	.....	16,200	5,590	.....	4,610	3,060	2,000	1,160	1,020	860	759
30	924	.....	11,500	5,480	.....	5,130	3,180	2,280	1,160	996	860	759
31	926	.....	9,670	4,610	.....	5,260	.....	2,250	.....	972	860	.....

a Interpolated.

Monthly discharge of Clackamas River near Cazadero, Oreg., for the year ending Sept. 30, 1918.

[Drainage area, 685 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	1,020	926	965	1.41	1.63	59,300
November	7,750	910	1,340	1.96	2.19	79,760
December	40,500	1,570	10,500	15.3	17.64	646,000
January	16,500	3,310	6,960	10.2	11.76	428,000
February	16,500	2,460	4,890	7.14	7.44	272,000
March	5,910	2,000	3,450	5.04	5.81	212,000
April	4,740	2,820	3,480	5.08	5.67	207,000
May	3,960	2,000	2,760	4.03	4.65	170,000
June	2,150	1,160	1,600	2.34	2.61	95,200
July	1,200	956	1,050	1.53	1.76	64,600
August	980	860	921	1.34	1.54	56,600
September	860	759	810	1.18	1.32	48,200
The year	40,500	759	3,230	4.72	64.02	2,338,000

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OAK GROVE FORK OF CLACKAMAS RIVER AT TIMOTHY MEADOWS NEAR CAZADERO, OREG.

LOCATION.—In T. 5 S., R. 8 E., about sec. 26 (unsurveyed), at Timothy Meadows, 11¼ miles above station at intake, 17 miles above mouth of Oak Grove Fork, and 43 miles above Cazadero, Clackamas County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 25, 1913, to November 26, 1916, and July 14 to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by employees of Portland Railway, Light & Power Co.

DISCHARGE MEASUREMENTS.—Made from footbridge 20 feet above gage.

CHANNEL AND CONTROL.—Bed composed of gravel. Control fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage for year occurred prior to period; minimum stage during period, from water-stage recorder, 0.60 foot July 28 (discharge, 134 second-feet).

1913–1916 and 1918: Maximum stage from water-stage recorder 237 feet June 17, 1916 (discharge, 584 second-feet); minimum stage from recorder 0.43 foot November 11, 1915 (discharge, 100 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

COOPERATION.—Field data furnished by Portland Railway, Light & Power Co.

Discharge measurements of Oak Grove Fork of Clackamas River at Timothy Meadows near Cazadero, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 8	Frank Ewing [a]	0.70	152	July 14	F. G. Robley [a]	.70	165
9	do	.70	143	Aug. 13	Ewing and Robley	.67	147

[a] Employee of Portland Railway, Light & Power Co.

Daily discharge, in second-feet, of Oak Grove Fork of Clackamas River at Timothy Meadows near Cazadero, Oreg., for the year ending Sept. 30, 1918.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1		139	170	11		147	186	21	142	152	181
2		139	173	12		150	186	22	147	152	178
3		137	178	13		152	186	23	152	155	173
4		137	181	14	160	152	199	24	147	157	173
5		139	183	15	157	152	186	25	139	160	170
6		139	183	16	155	152	186	26	139	160	165
7		139	183	17	155	152	186	27	137	160	163
8		142	183	18	155	152	186	28	134	163	160
9		144	186	19	150	152	186	29	137	165	152
10		144	186	20	144	152	183	30	137	165	147
								31	137	168	

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Monthly discharge of Oak Grove Fork of Clackamas River at Timothy Meadows near Cazadero, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July 14-31	160	134	146	5,210
August	166	137	151	9,289
September	199	147	178	10,600
The period	199	134	160	25,100

OAK GROVE FORK OF CLACKAMAS RIVER AT INTAKE NEAR CAZADERO, OREG.

LOCATION.—In SW. ¼ sec. 4, T. 6 S., R. 7 E., 2,000 feet above proposed intake of Oak Grove power development of Portland Railway, Light & Power Co., and 35 miles above Cazadero, Clackamas County.

DRAINAGE AREA.—131 square miles (measured by Portland Railway, Light & Power Co.).

RECORDS AVAILABLE.—May 21, 1909, to August 4, 1917, and June 8 to August 24, 1918.

GAGE.—Stevens water-stage recorder installed on right bank, used since December, 1916; Watson recording gage on left bank used March, 1912, to September, 1913; Friez recorder October, 1913, to October, 1916.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Boulders; irregular but apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage during period, from water-stage recorder, 1.35 feet June 8 (discharge, 670 second-feet); minimum stage during period, from water-stage recorder, 0.82 foot August 16 (discharge, 403 second-feet).

1909–1918: Maximum stage recorded, 3.40 feet November 24, 1909 (discharge, 2,670 second-feet); minimum discharge, 320 second-feet (gage height, 0.60 foot) October 17 to November 3, 1911.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory except from July 25 to August 11 when it was somewhat uncertain. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

COOPERATION.—Field data furnished by Portland Railway, Light & Power Co.

The following discharge measurement was made by Frank Ewing:

October 5, 1917: Gage height, 0.80 foot; discharge, 406 second-feet.

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Daily discharge, in second-feet, of Oak Grove Fork of Clackamas River at intake, near Cazadero, Oreg., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Day.	June.	July.	Aug.	Day.	June.	July.	Aug.
1	.....	530	570	11	610	466	415	21	565	458	476
2	.....	530	570	12	592	458	435	22	570	490	453
3	.....	525	555	13	586	458	423	23	570	505	440
4	.....	525	540	14	580	453	419	24	570	500	448
5	.....	520	530	15	575	453	403	25	555	505	.....
6	.....	520	520	16	570	458	403	26	540	540	.....
7	.....	505	476	17	570	462	431	27	535	540	.....
8	670	490	435	18	570	453	462	28	530	540	.....
9	646	490	440	19	565	448	480	29	520	555	.....
10	628	480	444	20	565	444	476	30	520	555	.....
								31	.....	570	.....

Monthly discharge of Oak Grove Fork of Clackamas River at intake, near Cazadero, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 8-30	670	520	574	26,200
July	570	444	497	30,600
August 1-24	570	403	468	22,300
The period	670	403	511	79,100

LEWIS RIVER BASIN.

LEWIS RIVER NEAR AMBOY, WASH.

LOCATION.—In sec. 36, T. 6, N., R. 3 E., at Cresap's ferry crossing, on county road from Amboy to Cougar, 1½ miles below Canyon Creek, 2 miles above Speilei Creek, and 5 miles northwest of Amboy, Clarke County.

DRAINAGE AREA.—665 square miles (measured on map in Water-Supply Paper 253, page 74, and checked on Forest Service map).

RECORDS AVAILABLE.—January 20, 1911, to September 30, 1918.

GAGE.—Inclined and vertical staffs on left bank; read by James Hanley.

DISCHARGE MEASUREMENTS.—Made from cable near gage.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; will shift during extreme floods. No well defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year determined by leveling to high-water marks, 16.4 feet during afternoon of December 18 (discharge, estimated from extension of rating curve, 60,000 feet); minimum stage recorded, 0.00 foot September 23 to 27 (discharge, 730 second-feet).

1911–1918: Maximum stage recorded that of 1918; minimum discharge recorded, 686 second-feet September 30, 1915 (gage height, 0.08 foot).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation shifted during flood of December 18. Rating curve used from October 1 to December 18, and curve used December 19 to September 30, both well defined between 800 and 14,000 second-feet, but poorly defined above. Gage read twice daily to half-tenths at medium and high stages, and to quarter-tenths at low water. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except during December for which they are fair on account of lack of high-water measurements, and during July, for which they are poor because of uncertain gage heights.

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Discharge measurements of Lewis River near Amboy, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 27	C. L. Batchelder	0.30	822
Apr. 18	do	2.55	4,290
Aug. 15	F. F. Henshaw	.34	988

Daily discharge, in second-feet, of Lewis River near Amboy, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,120	770	3,450	27,900	4,420	2,840	6,890	4,200	2,250	1,330	1,050	840
2	1,070	770	3,110	15,800	4,420	2,840	6,360	4,420	2,220	1,330	1,050	840
3	1,030	840	3,450	14,400	4,880	3,020	6,100	4,880	1,940	1,230	1,050	800
4	990	840	4,200	15,200	6,890	2,840	5,360	5,120	1,940	1,230	1,000	800
5	990	1,070	8,450	11,800	12,100	2,840	4,880	4,880	2,220	1,230	1,000	800
6	910	1,070	3,280	13,100	16,200	2,680	4,650	4,420	2,520	1,230	1,000	840
7	910	990	2,780	13,800	13,400	2,680	4,200	4,000	2,680	1,230	1,000	840
8	910	910	2,470	11,800	10,500	2,680	4,420	3,600	2,520	1,230	1,000	800
9	875	840	2,470	9,840	8,600	3,020	6,890	3,600	2,520	1,230	1,050	840
10	875	840	2,620	8,600	10,200	2,520	6,360	3,200	2,360	1,220	1,000	800
11	875	840	4,200	8,300	10,200	2,520	6,100	3,020	2,360	1,230	1,000	800
12	840	1,250	5,600	9,220	9,220	2,520	5,850	3,200	2,300	1,230	920	800
13	840	1,250	8,000	8,600	7,430	2,520	5,360	3,200	2,360	1,180	960	920
14	805	1,160	22,700	8,600	6,620	2,520	4,880	3,200	2,220	1,180	1,000	960
15	805	1,160	15,200	9,220	5,850	2,520	4,880	3,200	1,940	1,180	960	920
16	805	1,070	22,700	11,100	5,600	2,520	4,880	3,400	1,940	1,230	960	880
17	805	1,070	37,700	10,500	5,360	3,200	4,420	3,200	1,940	1,230	1,000	800
18	770	990	52,500	11,800	4,880	5,600	4,420	3,200	1,800	1,230	1,140	800
19	770	910	39,000	10,500	4,420	4,000	4,420	3,600	1,660	1,230	1,050	800
20	770	840	30,000	8,600	4,000	4,000	4,420	3,600	1,660	1,230	1,000	765
21	735	840	26,700	7,710	3,600	4,420	4,880	3,200	1,800	1,230	920	765
22	735	840	23,100	6,620	3,200	10,500	5,360	3,200	1,800	1,330	960	765
23	735	840	18,800	6,100	3,200	9,840	5,360	3,020	1,660	1,330	960	730
24	805	805	15,800	5,600	3,400	11,400	5,360	2,840	1,660	1,180	1,000	730
25	840	770	10,500	6,360	3,200	12,700	4,880	2,680	1,540	1,140	960	730
26	840	770	9,840	5,600	3,200	10,800	4,420	2,520	1,540	1,050	960	730
27	840	1,910	18,800	5,600	3,020	9,220	4,420	2,520	1,540	1,000	880	730
28	770	1,670	29,200	5,120	2,840	8,300	4,200	2,520	1,430	1,000	880	765
29	770	1,910	30,000	6,620	.....	7,430	4,200	2,840	1,330	960	880	765
30	770	2,470	27,500	5,600	.....	7,430	4,200	2,680	1,330	960	880	800
31	805	.....	25,500	4,650	.....	7,430	.....	2,520	.....	960	880	.....

Monthly discharge of Lewis River near Amboy, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 665 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	1,120	735	852	1.28	1.48	52,400
November	2,470	770	1,080	1.62	1.81	64,200
December	52,500	2,470	16,600	25.0	28.82	1,020,000
January	27,900	4,650	9,810	14.8	17.06	603,000
February	16,200	2,840	6,460	9.71	10.11	359,000
March	12,700	2,520	5,140	7.73	8.91	316,000
April	6,890	4,200	5,100	7.67	8.56	303,000
May	5,120	2,520	3,410	5.13	5.91	210,000
June	2,680	1,330	1,980	2.98	3.32	118,000
July	1,330	960	1,190	1.79	2.06	73,200
August	1,140	880	979	1.47	1.70	60,200
September	960	730	805	1.21	1.35	47,900
The year	52,500	730	4,460	6.71	91.09	3,230,000

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KALAMA RIVER BASIN.

KALAMA RIVER NEAR KALAMA, WASH.

LOCATION.—In sec. 7, T. 6 N., R. 1 E., 150 feet below power house of North Coast Power Co. and 10 miles east of Kalama, Cowlitz County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 6, 1911, to January 11, 1912; December 1, 1912, to September 30, 1913; August 19, 1916, to September 30, 1918.

GAGE.—Vertical staff bolted to rock ledge; lower section up to 8 feet on left bank; upper section, 8 to 12 feet, in a cove on right bank opposite lower section; read by L. A. Van Fleet. Gage at same location, but with datum 2.0 feet lower, used 1911 to January, 1912, and one with datum 3.0 feet lower used December, 1912, to September, 1913.

DISCHARGE MEASUREMENTS.—Made from a cable about half a mile below gage.

CHANNEL AND CONTROL.—Control is rock reef and bar of heavy gravel about 100 feet below gage; slightly shifting as shown by low-water measurements.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.3 feet at 3.20 p. m. December 18, observed by hydrographer (discharge, 11,700 second-feet); minimum stage recorded, 0.08 foot September 30 (discharge, 175 second-feet).

1911–1913 and 1916–1918: Maximum and minimum stages those of 1917–18.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—Operation of power plant causes some fluctuation, but gage is read only at times when load is steady.

ACCURACY.—Stage-discharge relation slightly shifting during extreme low stages. Two well-defined rating curves, which are the same above a stage of 2.0 feet, used during year, one from October 1 to March 31, and other for remainder of year; indirect method for shifting control used October 7 to 23 on account of drift on control. Records excellent, except during October, for which they are good.

Discharge measurements of Kalama River near Kalama, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	C. L. Batchelder	0.84	203	May 22	C. L. Batchelder	1.87	638
Dec. 18	James E. Stewart	10.30	11,700	June 28	do	1.08	302
19	do	8.20	7,630	Sept. 24	do	.71	186
Feb. 20	do	3.08	1,350				

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Daily discharge, in second-feet, of Kalama River near Kalama, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	261	218	1,250	3,390	1,320	1,180	1,620	930	532	310	240	210
2	261	218	1,110	3,750	1,320	1,110	1,460	980	510	292	234	204
3	261	570	930	3,630	1,620	1,050	1,320	930	488	292	231	204
4	246	415	1,620	3,630	2,930	1,050	1,250	1,050	465	310	225	201
5	246	435	1,180	3,040	5,250	1,050	1,180	1,050	465	310	234	201
6	246	415	1,250	2,820	6,360	990	1,180	980	465	310	228	204
7	232	378	1,050	3,510	5,070	930	930	870	465	292	222	204
8	232	342	930	3,040	3,270	930	990	705	465	292	234	204
9	232	292	990	2,310	2,710	930	1,050	660	442	292	237	204
10	218	292	930	1,950	3,390	930	1,620	655	442	292	222	201
11	218	292	990	2,130	3,390	1,110	1,180	630	420	292	234	204
12	218	645	2,310	2,410	2,610	1,110	1,320	630	420	292	228	204
13	218	645	7,290	2,130	2,410	1,050	1,110	630	400	292	228	204
14	218	500	8,730	3,150	1,950	1,050	1,180	630	400	275	225	201
15	218	415	4,400	3,150	1,950	980	1,110	630	380	275	275	198
16	205	378	6,960	3,510	1,950	990	1,950	655	362	275	240	198
17	205	308	7,110	3,750	1,950	1,250	1,950	655	345	275	275	195
18	205	308	10,700	3,880	1,780	1,250	1,950	705	345	275	310	195
19	205	292	7,650	3,150	1,460	990	1,950	705	328	275	275	192
20	205	292	4,530	2,510	1,320	1,320	1,950	705	328	258	240	189
21	205	276	3,150	2,040	1,320	1,700	1,320	680	328	258	240	186
22	205	276	5,770	1,780	1,250	4,660	1,320	630	328	310	258	186
23	205	276	4,530	1,620	1,250	3,270	1,250	605	328	328	258	186
24	292	261	2,930	1,620	1,320	3,880	1,050	580	328	275	240	183
25	292	276	2,130	1,620	1,250	3,750	1,050	555	328	258	240	183
26	276	246	2,820	1,540	1,250	2,710	990	532	310	275	231	180
27	261	276	4,660	2,310	1,180	2,510	1,050	532	310	258	225	180
28	246	455	6,360	1,780	1,180	2,130	990	532	310	240	216	178
29	232	645	5,490	1,950	.....	2,040	990	532	310	240	216	178
30	232	1,300	4,530	1,780	.....	2,040	990	555	310	240	210	175
31	218	.....	7,650	1,460	.....	1,780	.....	555	.....	240	210	.....

Monthly discharge of Kalama River near Kalama, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	292	205	233	14,300
November	1,300	218	402	23,900
December	10,700	930	3,930	242,000
January	3,880	1,460	2,500	153,600
February	6,360	1,180	2,200	127,600
March	4,660	930	1,670	103,000
April	1,950	930	1,340	79,700
May	1,050	532	698	42,900
June	532	310	338	20,100
July	328	240	281	17,300
August	310	210	238	14,600
September	210	175	194	11,500
The year	10,700	175	1,190	858,000

COWLITZ RIVER BASIN.

COWLITZ RIVER AT LEWIS, WASH.

LOCATION.—In sec. 15, T. 13 N., R. 9 E., at suspension bridge 1 mile northeast of Lewis and 1½ miles below Lake Creek, Lewis County.

DRAINAGE AREA.—275 square miles (measured on Plate I, Water-Supply Paper 313).

RECORDS AVAILABLE.—July 1, 1911, to September 30, 1918.

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GAGE.—Vertical and inclined staffs on left bank 100 feet below suspension bridge; installed January 26, 1918; read by William Sethe and J. A. Combs. Two temporary staff gages at same site as present gage were read December 20, 1917. to January 26, 1918. A vertical staff on left bank 40 feet above bridge, and at independent datum, was read May 3, 1915, to December 17, 1917, when it was washed out. Original gage, read until May 3, 1915, was installed August 15, 1907, by Valley Development Co. at same site as present gage. Datum of original gage was 1.98 feet higher than present datum. Original gage was washed out November 20, 1911, and November 3, 1914, but was replaced each time at same site and datum. Datum of published gage heights for year ending September 30, 1913, is 0.07 foot lower than correct datum for that period, as corrections to gage heights were not applied for that year.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of gravel and sand; shifts at high water. Right bank subject to overflow at extremely high stages. Control is gravel and boulder riffle 150 feet below gage. Stage of zero flow, according to measurement made September 17, 1918, gage height −0.3 foot ±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, 10.1 feet at 8 a. m. December 29, estimated by J. A. Combs (discharge, from extension of rating curve, 22,700 second-feet); minimum stage recorded, 0.58 foot September 25 (discharge, 332 second-feet).

1911-1918—Maximum stage, that for 1918; minimum stage recorded, 0.95 foot October 30 to November 3, 1911 (discharge, 285 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 18 and March 13 to 25. Rating curve used October 1 to December 17 fairly well defined; curve used December 20 to March 12 fairly well defined below 5,000 second-feet, and poorly defined above; curve used March 26 to September 30 well defined below 3,000 second-feet and fairly well defined above. Staff gage read to hundredths once daily about two-thirds of the time. Daily discharge ascertained by applying daily gage height to rating table, and interpolating discharge for days when gage was not read; shifting-control method used March 13 to 25. Records fair; except for period December 18 to January 7, for which they are poor.

COOPERATION.—Gage-height record furnished by United States Forest Service and Portland Railway, Light & Power Co.

Discharge measurements of Cowlitz River at Lewis, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 23	Carson and Combs	1.97	1,780	Apr. 29	Carson and Combs	2.50	2,260
26	do	2.01	1,750	July 27	Lasley Lee	1.36	938
28	L. D. Carson	1.88	1,630	Sept. 17	T. G. Bedford	1.02	611
Apr. 25	do	2.48	2,240	18	do	.80	493
26	do	2.29	2,000				

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Daily discharge, in second-feet, of Cowlitz River at Lewis, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	655	439	616	8,300	1,200	545	1,270	2,260	2,130	2,130	776	680
2	655	439	547		1,150	545	1,240	2,800	1,950	2,130		620
3	655	610	547		1,520	534	1,200	3,280	1,770	1,890		545
4	715	781	573	6,400	1,890	522	1,140	3,770	2,130	1,770		785
5	685	685	500	5,660	2,260	510	1,090	3,300	3,590	1,840		545
6	655	599	547	6,150	2,950	475	980	2,830	4,970	1,910		510
7	627	547	524	5,900	2,660	475	1,040	2,360	5,190	1,990		475
8	627	513	500	4,340	2,130	468	1,090	1,890	4,750	2,060	700	510
9	599	479	524	3,570	1,770	462	1,890	1,770	5,080	2,130	740	580
10	573	458	547	2,800	1,410	435	2,130	1,650	5,420	1,780	980	785
11	548	480	738	3,100	1,060	408	2,010	1,530	4,340	1,420	980	830
12	524	502	929	4,140	700	442	1,830	1,830	5,120	1,540	740	620
13	500	524	5,030	3,860	1,530	395	1,650	2,130	5,900	1,660	830	735
14	547	500	10,700	3,590	1,360	418	1,450	2,520	3,950	1,770	830	830
15	547	458	5,030	2,520	1,200	440	1,250	2,010	3,720	1,890	785	785
16	500	448	7,340	2,390	1,150	462	1,150	2,010	3,490	2,010	620	620
17	458	439	9,200	2,520	1,040	561	1,040	2,010	3,260	1,950	580	580
18	446	420	.....	2,590	930	660	1,100	1,890	2,800	1,890	740	510
19	433	420	.....	2,660	815	660	1,150	1,710	2,950	1,490	660	580
20	420	500	10,400	2,340	700	660	1,650	1,580	2,950	1,090	580	475
21	458	627	7,740	2,010	660	660	2,520	1,440	3,770	1,070	620	448
22	448	572	13,700	1,890	700	1,420	2,660	1,360	3,590	1,040	700	357
23	439	516	9,770	1,770	660	1,200	2,660	1,420	3,340	1,020	740	357
24	500	458	8,220	2,010	646	1,730	2,390	1,420	3,100	1,000	785	344
25	458	448	6,660	1,890	634	2,260	2,260	1,250	2,520	976	785	332
26	449	439	9,170	1,770	620	1,890	2,010	1,200	2,260	953	785	456
27	440	458	17,000	1,710	545	1,650	1,890	1,150	2,390	930	740	580
28	430	500	.....	1,650	545	1,420	2,080	1,530	2,260	882	880	700
29	420	547	22,700	1,650	.....	1,380	2,260	1,680	2,130		620	574
30	439	685	.....	1,420	.....	1,350	2,390	1,830	2,130		580	448
31	420	.....	.....	1,260	.....	1,310	.....	1,980	.....		580	.....

NOTE.—Discharge not determined Dec. 18, 19, 28, 30, and 31, because gage was not read, and flood stage rendered interpolation very unreliable.

Monthly discharge of Cowlitz River at Lewis, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 275 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	715	420	525	1.91	2.20	32,300
November	781	420	516	1.88	2.10	30,700
December	.....	500	a 6,800	24.7	28.48	418,000
January	.....	1,200	3,500	12.7	14.64	215,000
February	2,950	545	1,230	4.47	4.66	68,300
March	2,260	395	850	3.09	3.56	52,300
April	2,660	980	1,680	6.11	6.82	100,000
May	3,770	1,150	1,980	7.20	8.30	122,000
June	5,900	1,770	3,440	12.5	13.95	205,000
July	2,130	.....	1,510	5.49	6.33	92,800
August	980	580	733	2.67	3.08	45,100
September	830	332	572	2.08	2.32	34,000
The year	.....	332	1,950	7.09	96.44	1,420,000

a Estimated.

LAKE CREEK AT OUTLET OF PACKWOOD LAKE, NEAR LEWIS, WASH.

LOCATION.—In sec. 21, T. 13 N., R. 10 E., 400 feet below outlet of Packwood Lake and 5 miles east of Lewis, Lewis County.

DRAINAGE AREA.—About 18 square miles (measured on Pl. I, Water-Supply Paper 313).

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RECORDS AVAILABLE.—September 2, 1911, to September 30, 1918.

GAGE.—Friez water-stage recorder on left bank with outside and inside staff gages, installed August 3, 1918; inspected by J. A. Combs. Original gage read September, 1911, to December 17, 1917, was vertical staff on right bank about 100 feet downstream, at independent datum; washed out by flood on December 18, 1917. Temporary staff gage near site of present recorder, at independent datum was read December 18, 1917, to January 24, 1918. Gage read January 24 to July 28, 1918, was vertical staff at site of original gage, and at datum 2.00 feet lower.

DISCHARGE MEASUREMENTS.—Made by wading near gage, or from footbridge 200 feet upstream.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders. Partial control about 20 feet downstream from gage formed by several trees felled across the stream from both banks. Trees partly broken and wedged against a large boulder in midstream. Control for original gage was timber weir with rectangular opening 19.94 feet long, 4.4 feet high, and one-inch crest; destroyed by flood December 18 1917. Control for temporary gages was flood-scoured channel.

EXTREMES OF DISCHARGE.—Maximum stage during the year occurred during flood on December 18, estimated 6 feet, original gage datum (discharge not determined); minimum stage recorded, 0.28 foot on March 21 (discharge, 29 second-feet).

1911–1918: Maximum stage recorded, 4.00 feet, morning reading June 18, 1916 (discharge, 582 second-feet), actual maximum occurred December 18, 1917; minimum stage recorded in 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 18 when gage and weir were destroyed by flood; changed again January 24 when gage was moved to different site; and again August 1 when artificial control for recorder station was constructed. Rating curve used October 1 to December 17 well defined by measurements in 1916 and 1917; no rating December 18 to January 23; curve used January 24 to July 31 fairly well defined between 40 and 150 second-feet; curve used August 3 to September 30 well defined. Gage read to hundredths twice daily except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying daily mean gage height to rating table. Records good for periods October to December 15, and August and September; fair for period May to July; poor for remainder of year.

COOPERATION.—Gage-height record furnished by Portland Railway, Light & Power Co.

Discharge measurements of Lake Creek at outlet of Packwood Lake, near Lewis, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 24	Carson and Combs	1.12	142	July 28	Lee and Combs	[a] 1.92	104
Apr. 28	L. D. Carson	.95	110	Sept. 18	Bedford and Combs	[b] 1.38	51
28	do	.95	106				

[a] Reading at recorder site; former staff gage read 0.97 foot.
[b] Reading at recorder site; former staff gage read 0.51 foot.

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Daily discharge, in second-feet, of Lake Creek at outlet of Packwood Lake near Lewis, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	66	38	48		118	83	53	117	137	190	103	67
2	65	37	47		113	78	52	121	129	180	100	67
3	62	36	47		113	76	51	129	129	171	97	62
4	60	41	47		113	72	50	145	121	162	92	58
5	59	42	46		129	67	50	154	137	154	82	55
6	58	44	47		125	66	52	162	180	154	77	54
7	58	42	45		121	64	54	137	273	154	77	52
8	57	42	46		121	61	56	183	307	145	77	51
9	52	40	46		121	60	58	129	330	162	92	51
10	52	39	45		121	58	65	121	330	171	113	51
11	49	38	45		121	56	65	121	354	162	126	51
12	48	40	63	190	113	52	70	113	378	145	113	50
13	46	46	124		113	52	69	113	403	145	97	51
14	45	43	152		113	52	67	121	403	154	92	54
15	43	43	152		113	50	66	121	330	154	92	55
16	42	42	287		108	49	65	121	273	180	90	54
17	42	41	422		103	48	64	121	262	199	87	54
18	42	41			98	46	64	113	240	199	84	52
19	40	40			95	45	65	110	230	190	82	51
20	39	40			92	38		106	240	162	80	51
21	38	39			90	29		106	240	145	77	51
22	38	38			87	36		106	284	129	77	49
23	38	38			87	46	86	106	296	145	82	47
24	36	38	600	137	87	54		106	273	129	82	47
25	37	40		136	84	50		106	262	129	82	47
26	43	42		134	84	45		88	240	121	77	47
27	42	47		132	84	44		84	230	121	77	47
28	41	51		130	84	44	106	82	219	106	72	47
29	40	51		129	.....	54	110	80	209	108	72	47
30	40	49		121	.....	54	113	95	199	106	67	46
31	38	.....		117	.....	53	.....	113	.....	106	67	.....

NOTE.—Fragmentary record of daily gage height from Dec. 18 to Jan. 24 are given in separate table: discharge determined by comparison with records of flow of Cowlitz River at Lewis, Wash. Gage not read, discharge interpolated Oct. 17, 21, Nov. 25, numerous days Jan. to Apr., May 1, 5, 8, 19, Aug. 1, 2, 16-20. Braced figure shows estimated mean discharge for period indicated.

Daily gage height, in feet, of Lake Creek at outlet of Packwood Lake, near Lewis, Wash., for the period, Dec. 18, 1917, to Jan. 24, 1918.

Day.	Dec.	Jan.	Day.	Dec.	Jan.	Day.	Dec.	Jan.
1	.....	.....	11	.....	0.41	21	1.95	.....
2	.....	.....	12	.....	.....	22	.....	.....
3	.....	1.32	13	.....	.....	23	.....	.....
4	.....	1.20	14	.....	.....	24	1.62	−0.08
5	.....	.....	15	.....	.....	25	.....	.....
6	.....	.....	16	.....	.....	26	.....	.....
7	.....	.56	17	.....	.22	27	1.82	.....
8	.....	.50	18	4.80	.20	28	2.55	.....
9	.....	.46	19	.....	.....	29	.....	.....
10	.....	.....	20	2.60	.....	30	.....	.....
						31	2.60	.....

NOTE.—Gage for this period at independent datum.

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Monthly discharge of Lake Creek at outlet of Packwood Lake, near Lewis, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	66	36	47.0	2,890
November	51	36	41.6	2,480
December	.....	45	325	20,000
January	.....	117	175	10,800
February	129	84	105	5,830
March	82	29	54.2	3,320
April	113	50	71.8	4,270
May	162	80	115	7,070
June	403	121	255	15,200
July	190	106	151	9,280
August	125	67	86.6	5,320
September	67	46	52.2	3,110
The year	.....	29	124	89,600

STREAMS BETWEEN COLUMBIA RIVER AND KLAMATH RIVER.

ROGUE RIVER BASIN

ROGUE RIVER BELOW PROSPECT, OREG.

LOCATION.—In sec. 6, T. 33 S., R. 3 E., at Prospect power plant of California-Oregon Power Co., 2 miles below Prospect, Jackson County, 47 miles northeast of Medford, 1 mile below mouth of Mill Creek, and 2 miles above Middle Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 3, 1913, to September 30, 1918.

GAGE.—Vertical staff on right bank about 100 feet above power house; read by O. L. Irwin and S. Pardee.

DISCHARGE MEASUREMENTS.—Made from cable about 500 feet above gage.

CHANNEL AND CONTROL.—Control composed of large boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.4 feet January 12 (discharge, 3,540 second-feet; total, including discharge of flume, 3,720 second-feet); minimum stage recorded, 2.5 feet on various days in November, December, August, and September (discharge, 410 second-feet); total minimum, including flume, occurred August 12 to 14 (discharge, 554 second-feet).

1913–1918: Maximum stage recorded is that of 1918; minimum stage recorded, 2.3 feet September 30 to October 3, October 10, and November 7, 1915 (discharge, 400 second-feet; total, including flume, 544 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—The California-Oregon Power Co.'s flume diverts around this station; a record is kept of this diversion (see p. 109).

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined; gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of Rogue River below Prospect, Oreg., during the year ending Sept. 30, 1918.

[Made by C. L. Batchelder.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 15	3.02	805
Sept. 18	2.55	432

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Daily discharge, in second-feet, of Rogue River below Prospect, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	550	470	970	1,160	925	790	1,910	1,740	1,110	590	470	440
2	550	510	670	1,060	925	835	1,800	1,800	1,060	630	470	440
3	550	510	590	970	880	970	1,580	1,800	1,060	590	440	440
4	550	510	470	1,470	880	970	1,470	2,020	1,060	550	470	440
5	550	590	470	1,310	1,580	925	1,420	1,800	1,110	550	470	410
6	550	550	470	1,160	2,370	790	1,360	1,640	1,260	590	470	410
7	510	510	440	1,580	2,250	835	1,420	1,580	1,160	590	470	440
8	510	510	410	1,470	1,800	835	1,420	1,580	1,110	590	440	510
9	510	470	410	1,360	1,580	835	1,690	1,580	1,060	590	440	470
10	510	510	410	1,210	1,470	790	1,740	1,470	1,060	590	470	470
11	510	510	410	1,210	1,420	835	1,690	1,420	970	550	440	470
12	510	630	410	3,400	1,360	835	1,690	1,420	970	590	410	470
13	510	550	510	2,250	1,310	790	1,580	1,470	1,060	550	410	470
14	510	510	790	1,910	1,210	790	1,520	1,470	925	550	410	470
15	510	470	790	1,800	1,110	790	1,360	1,470	880	550	470	470
16	470	470	750	1,800	1,110	790	1,360	1,360	790	550	510	470
17	470	470	1,110	1,910	1,060	925	1,360	1,360	790	550	510	470
18	470	470	1,360	2,250	970	1,260	1,360	1,360	790	550	510	440
19	470	470	1,160	1,800	970	1,260	1,360	1,260	790	550	510	440
20	510	470	1,470	1,690	880	1,260	1,520	1,260	790	550	470	440
21	510	470	1,020	1,470	835	1,160	1,800	1,210	710	550	470	440
22	510	440	880	1,360	880	1,360	1,800	1,160	710	550	470	440
23	510	440	1,580	1,310	880	1,470	1,800	1,210	710	630	470	440
24	510	440	2,490	1,160	880	1,640	1,800	1,160	710	590	470	410
25	510	410	1,690	1,360	790	1,910	1,800	1,160	630	550	470	410
26	510	410	1,580	1,210	835	1,800	1,690	1,160	710	590	470	410
27	510	410	2,020	1,160	790	1,690	1,690	1,110	630	510	440	410
28	470	470	2,020	1,060	790	1,580	1,580	1,060	710	510	440	410
29	470	1,360	1,800	1,160	.....	1,690	1,640	1,060	710	470	440	410
30	470	1,690	1,520	1,060	.....	1,910	1,690	1,210	590	470	440	410
31	470	.....	1,310	880	.....	2,020	.....	1,160	.....	470	440	.....

Monthly discharge of Rogue River below Prospect, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	550	470	507	31,200
November	1,690	410	557	33,100
December	2,490	410	1,030	63,300
January	3,400	880	1,480	91,000
February	2,370	790	1,170	65,000
March	2,020	790	1,170	71,900
April	1,910	1,360	1,600	95,200
May	2,020	1,060	1,400	86,100
June	1,260	590	888	52,800
July	630	470	556	34,200
August	510	440	461	28,300
September	470	410	442	26,300
The year	3,400	410	938	678,000

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Combined monthly discharge of Rogue River and California-Oregon Power Co.'s flume below Prospect, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	720	640	677	41,600
November	1,870	594	740	44,000
December	2,670	600	1,220	75,000
January	3,580	1,060	1,670	103,000
February	2,560	960	1,340	74,400
March	2,190	960	1,340	82,400
April	2,670	1,580	1,760	105,000
May	2,190	1,220	1,560	95,900
June	1,420	747	1,040	61,900
July	780	614	702	43,200
August	654	554	608	37,400
September	667	567	599	35,600
The year	3,580	554	1,100	799,000

ROGUE RIVER NEAR TOLO, OREG.

LOCATION.—In sec. 18, T. 36 S., R. 2 W., at Ray Gold railroad station, just below Gold Ray dam and power house of California-Oregon Power Co., 1¼ miles below Tolo, Jackson County, 7 miles above Gold Hill, and half a mile below mouth of Bear Creek.

DRAINAGE AREA.—2,020 square miles.

RECORDS AVAILABLE.—August 30, 1905, to September 30, 1918.

GAGE.—Friez water-stage recorder referred to vertical staff bolted to concrete pier of bridge near right bank; read by operators of Gold Ray plant.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet below gage.

CHANNEL AND CONTROL.—Composed of rock and boulders; slightly shifting. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 10.9 feet at noon January 12 (discharge, 25,800 second-feet); minimum stage indeterminate, as water went below intake pipe of well (gage height 0.20 foot), for a few minutes practically every night during low water (discharge probably 400 second-feet or less).

1905–1918: Maximum stage recorded, 20 feet at 7.30 a. m. November 23, 1909 (discharge, estimated by extension of rating curve, 60,000 second-feet); minimum discharge in 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—A large area of land is irrigated from Rogue River and its tributaries.

REGULATION.—Discharge is influenced by changes of load on power plant just above station.

ACCURACY.—Stage-discharge relation shifted slightly during flood of January 12. Two well defined rating curves used, one from October 1 to January 11 and other for remainder of year. Discharge integrated October 1 to July 31; rating table applied to mean daily gage height obtained by inspecting the recorder graph for remainder of year. Operation of water-stage recorder satisfactory. Records excellent.

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Discharge measurements of Rogue River near Tolo, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 21	R. P. Cowgill [a]	2.12	2,670	Jan. 14	R. C. Briggs	6.25	11,000
Jan. 10	R. C. Briggs	2.46	3,070	June 17	C. L. Batchelder	1.35	1,640
12	do	10.40	24,000	Sept. 15	do	.99	1,320

[a] Engineer, Rogue River Valley Canal Co.

Daily discharge, in second-feet, of Rogue River near Tolo, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,300	1,220	6,340	2,620	2,740	3,030	4,220	3,050	1,980	1,340	1,190	1,100
2	1,290	1,230	2,850	2,350	2,940	3,040	3,860	3,110	2,000	1,360	1,160	1,080
3	1,270	1,260	1,930	2,260	2,920	3,520	3,470	3,280	2,020	1,320	1,130	1,080
4	1,280	1,350	1,620	2,640	2,960	3,600	3,220	3,260	2,040	1,320	1,140	1,080
5	1,240	1,360	1,580	2,700	4,920	3,240	3,070	3,210	2,040	1,290	1,150	1,100
6	1,240	1,420	1,520	2,450	9,120	2,930	3,010	2,970	2,120	[a]1,280	1,190	1,080
7	1,230	1,300	1,500	[a]2,760	9,500	2,750	3,120	2,880	2,220	1,270	1,140	1,080
8	1,310	1,270	1,430	3,080	6,010	2,780	3,150	2,840	1,950	1,330	1,040	1,180
9	1,210	1,250	1,510	3,540	4,880	3,080	3,330	2,880	2,080	1,300	1,120	1,280
10	1,210	[a]1,270	1,530	2,730	4,150	3,160	3,500	2,940	1,860	1,310	[a]1,110	1,280
11	1,260	[a]1,300	1,460	2,660	3,870	3,060	3,440	2,750	1,840	1,320	1,100	1,180
12	1,240	1,320	1,420	16,700	4,820	3,450	3,420	2,590	1,780	1,320	1,090	1,180
13	[a]1,220	1,400	1,580	9,600	6,140	3,880	3,340	2,360	1,850	1,280	1,080	1,190
14	1,200	1,360	2,220	9,580	5,400	3,370	3,220	2,530	1,760	1,270	1,060	1,200
15	1,300	1,250	2,250	7,040	4,460	3,140	3,040	2,570	1,670	1,370	1,180	1,320
16	1,240	1,270	2,020	7,720	4,870	3,160	2,950	2,500	1,630	1,290	1,180	1,280
17	1,250	1,250	2,410	7,280	5,040	[a]3,720	2,860	2,430	1,650	1,300	1,180	1,230
18	1,240	1,200	2,920	6,960	4,400	4,280	2,920	[a]2,350	1,590	1,260	[a]1,160	1,180
19	1,300	1,270	2,480	5,690	3,770	5,100	2,850	2,270	1,540	1,300	1,140	1,180
20	1,290	1,250	2,770	4,710	3,400	4,330	2,960	1,990	1,530	[a]1,280	1,120	1,170
21	1,170	1,260	2,510	4,230	3,180	4,110	3,170	2,150	1,480	[a]1,260	1,140	1,150
22	1,220	1,260	2,200	3,660	3,250	4,000	3,470	2,060	1,380	1,240	1,140	1,140
23	1,200	1,280	[a]4,960	3,200	3,620	[a]4,070	3,480	2,080	1,430	1,200	1,140	1,180
24	1,220	1,300	7,720	3,150	4,170	4,140	3,400	2,070	1,440	1,320	1,140	1,180
25	1,210	1,220	4,700	3,060	3,580	5,310	3,330	2,010	1,400	1,190	1,120	1,180
26	1,260	1,240	4,190	3,090	3,400	5,150	3,320	2,050	1,390	1,230	1,100	1,170
27	1,210	1,280	[a]4,660	2,840	3,270	4,800	3,200	2,130	1,400	1,210	1,100	1,180
28	1,190	1,360	5,130	2,780	3,060	4,210	3,100	2,080	1,390	1,190	1,080	1,140
29	1,220	2,360	4,070	2,960	.....	3,950	3,060	2,030	1,330	1,100	1,080	1,120
30	1,200	4,510	3,360	3,110	.....	4,100	3,100	2,070	1,330	1,120	1,100	1,120
31	1,180	.....	2,880	2,800	.....	4,340	.....	2,060	.....	1,190	1,100	.....

[a] Interpolated.

Monthly discharge of Rogue River near Tolo, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,310	1,170	1,240	76,200
November	4,510	1,200	1,430	85,100
December	7,720	1,430	2,890	178,000
January	16,700	2,260	4,510	277,000
February	9,500	2,740	4,420	245,000
March	5,310	2,770	3,770	232,000
April	4,220	2,850	3,250	193,000
May	3,360	1,990	2,510	154,000
June	2,230	1,330	1,700	101,000
July	1,370	1,100	1,270	78,100
August	1,190	1,060	1,130	69,500
September	1,320	1,060	1,160	69,000
The year	16,700	1,060	2,420	1,760,000

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CALIFORNIA-OREGON POWER CO.'S FLUME NEAR PROSPECT, OREG.

Location.—In sec. 6, T. 33 S., R. 3 E., at lower end of power flume, just above forebay and 2 miles below Prospect, Jackson County.

Records available.—August 1, 1913, to September 30, 1918.

Gage.—Vertical staff in stilling box on right side of flume, about 500 feet above forebay, used after August 17, 1915. Gage 1 mile above forebay used August 1, 1913, to August 16, 1915.

Discharge measurement.—Made from collar of flume.

Channel and control.—Wooden flume at the end of which there is a free fall into the forebay; practically permanent.

Extremes of discharge.—Maximum stage recorded during year, 2.6 feet on various days in December and January (discharge, 198 second-feet); minimum stage recorded 2.2 feet on various days during June, July, and August (discharge, 144 second-feet).

1916–1918: Maximum stage recorded, 2.7 feet April 25, 26, 30, May 1 and 2, 1916 (discharge, 212 second-feet); minimum stage 1.90 feet December 27, 1916 (discharge, 108 second-feet).

Ice.—Stage-discharge relation not affected by ice.

Accuracy.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read once daily to half-tenths. Daily discharge ascertained by applying daily gage height to rating table. Records good.

California-Oregon Power Co.'s flume diverts water from Rogue River in SE. ¼ sec. 30, T. 32 S., R. 3 E., and delivers it to the power plant in NW. ¼ sec. 6, T. 33 S., R. 3. E., where a head of about 500 feet is obtained. No discharge measurements were made during the year.

Daily discharge, in second-feet, of California-Oregon Power Co.'s flume near Prospect, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	170	170	184	184	184	170	164	170	157	144	144	157
2	170	170	184	184	184	170	164	170	157	150	144	157
3	170	170	184	184	184	170	170	170	157	157	144	157
4	170	184	184	184	177	170	170	170	157	157	144	157
5	170	184	184	184	177	170	170	170	157	157	144	157
6	170	184	184	177	177	170	170	170	157	157	144	157
7	170	184	184	177	184	170	164	170	144	144	144	157
8	170	184	184	184	184	170	164	170	144	144	144	157
9	170	184	191	184	184	170	170	170	157	144	144	157
10	170	184	191	184	184	170	170	170	157	144	144	157
11	170	184	198	184	177	170	170	170	157	144	144	157
12	170	184	198	184	184	170	164	170	157	144	144	157
13	170	184	198	191	184	170	157	157	157	144	144	157
14	170	184	198	191	184	170	157	157	157	144	144	157
15	170	184	198	184	184	170	157	157	157	144	144	157
16	170	184	184	191	184	170	157	157	157	144	144	157
17	170	184	184	198	170	170	157	157	157	144	144	157
18	170	184	198	198	170	170	164	157	157	144	144	157
19	170	184	198	191	157	170	164	157	157	144	144	157
20	170	184	198	184	157	177	157	157	157	144	144	157
21	170	184	184	184	157	177	157	157	157	144	144	157
22	170	184	184	184	170	170	157	157	157	144	144	157
23	170	184	184	184	170	170	157	157	157	144	144	157
24	170	184	184	184	157	170	157	157	157	144	144	157
25	170	184	184	184	157	170	157	157	157	144	150	157
26	170	184	184	184	157	170	157	157	157	144	157	157
27	170	184	184	184	170	170	157	157	157	144	157	157
28	170	184	184	184	170	170	164	157	157	144	157	157
29	170	184	184	184	.....	170	170	157	157	144	157	157
30	170	184	184	184	.....	170	170	157	157	144	157	157
31	170	.....	184	184	.....	170	.....	157	.....	144	157	.....

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Monthly discharge of California-Oregon Power Co.'s flume near Prospect, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre feet.
	Maximum.	Minimum.	Mean.	
October	170	170	170	10,500
November	184	170	183	10,900
December	198	184	188	11,600
January	198	177	185	11,380
February	184	157	174	9,660
March	177	170	170	10,500
April	170	157	163	9,700
May	170	157	162	9,960
June	157	144	156	9,280
July	157	144	146	8,980
August	157	144	147	9,040
September	157	157	157	9,340
The year	198	144	167	121,000

SOUTH FORK OF BIG BUTTE CREEK NEAR BUTTE FALLS, OREG.

LOCATION.—In SE. ¼ sec. 11, T. 35 S., R. 2 E., at covered highway bridge 1 mile above Butte Falls, Jackson County, and 2 miles above junction of North and South forks.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 20, 1910, to October 5, 1911; August 5 to October 10, 1915; October 31, 1917, to September 30, 1918.

GAGE.—Vertical staff on pier near left bank; read about 3 times a week by C. W. H. Heideman.

DISCHARGE MEASUREMENTS.—Made in 1918 by wading.

CHANNEL AND CONTROL.—Composed of rocks and gravel; slightly shifting at intervals.

EXTREMES OF DISCHARGE.—Maximum stage recorded 3.2 feet at 1.30 p. m. January 13 (discharge, 1,280 second-feet); minimum stage recorded 1.3 feet on various days during August and September (discharge, 92 second-feet).

1910–11, 1915, and 1918: Maximum stage recorded in 1918; minimum stage recorded, 1.41 feet in August and September, 1915 (discharge, 85 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—A small amount of land is irrigated above this station. The flume supplying water to the State fish hatchery diverts 4 or 5 second-feet around the gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve fairly well defined below 100 second-feet but poorly defined above. Gage read once on days for which discharge is given. Daily discharge ascertained by applying daily gage height to rating table. Records fair during high stages and good during remainder of year.

Discharge measurements of South Fork of Big Butte Creek near Butte Falls, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	
			Creek.	Flume.
		Feet.	*Sec.-ft.*	*Sec.-ft.*
Oct. 31	R. P. Cowgill [a]	1.40	104	4.9
June 15	C. L. Batchelder	1.41	102	4.6
15	J. B. Platt [b]	1.41	106	4.6
30	do	1.37	98	.....
Aug. 20	do	1.31	95	.....
Sept. 17	C. L. Batchelder	1.30	92	3.5
Oct. 14	J. B. Platt	1.29	93	4.4

[a] Engineer, Rogue River Valley Canal Co. [b] Engineer, Medford Irrigation District.

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Daily discharge, in second-feet, of South Fork of Big Butte Creek near Butte Falls, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1			230									
2			150			230		150	102			92
3						230		120				
4		102	120						120	102		
5							230				92	
6				120				120	120			92
7							230					
8						230				102		
9					430			135	120			92
10		102	102	230		270	190					
11		102									92	
12					270			120				
13		102		1,230					102	102		
14		102	102	570		230						92
15				570					104			
16		102	120					190				
17		102				270						92
18		102		570	230					102		
19			120				150				92	
20		102									93	
21							150	150	102			
22		102					190					92
23					230	320					92	
24		102	120	230								92
25		102								102		
26		102				270	150	150				
27			150	230	230							
28				150			190					
29									102		94	
30			120					120	99	102		
31	102					320						

NOTE.—These discharges do not include the water diverted around gage in fish hatchery flume, estimated as 4 or 5 second-feet.

Monthly discharge of South Fork of Big Butte Creek near Butte Falls, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October			102	6,270
November	102	102	102	6,070
December		102	133	8,180
January	1,280	120	439	27,000
February			278	15,400
March		230	263	16,200
April			185	11,000
May	190	120	139	8,550
June	120	99	108	6,430
July	102	102	102	6,270
August	94	92	92.5	5,690
September	92	92	92.0	5,470
The year	1,280	92	170	123,000

NOTE.—Monthly mean discharge taken as mean of days when gage was read.

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BIG BUTTE CREEK BELOW BUTTE FALLS, OREG.

LOCATION.—In sec. 4, T. 35 S., R. 2 E., 1 mile below town of Butte Falls, Jackson County, and just below junction of North and South forks.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 9 to September 30, 1918.

GAGE.—Lietz eight-day water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Composed of rocks and small boulders; may shift slightly.

EXTREMES OF DISCHARGE.—Maximum stage for period of record from water-stage recorder 1.57 feet June 9 (discharge, 168 second-feet); minimum stage 1.20 feet reached momentarily on several days in August and September owing to operation of mill just above (discharge not computed); minimum daily mean 1.44 feet September 23 (discharge, 135 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—A few small tracts irrigated above station.

REGULATION.—Mill dam at Butte Falls affects flow by ponding water for short periods.

ACCURACY.—Stage-discharge relation practically permanent for period. Rating curve fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

Discharge measurements of Big Butte Creek below Butte Falls, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 15	Batchelder and Piatt [a].	1.58	170	Aug. 12	J. B. Piatt	1.50	156
30	J. B. Piatt	1.52	158	20	do	1.49	146
July 7	do	1.51	157	Sept. 17	Batchelder and Rhodes.	1.49	139
28	do	1.50	154	24	J. B. Piatt	1.49	151
Aug. 8	Cowgill and Dillard	[b]1.53	135				

[a] Engineer, Medford Irrigation District. [b] Gage height uncertain.

Daily discharge, in second-feet, of Big Butte Creek below Butte Falls, Oreg., for the year ending Sept. 30, 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		158	145	138	11	[a]166	[a]154	145	148	21	155	150	145	148
2		158	145	138	12	[a]166	[a]154	143	148	22	155	150	145	150
3	175	155	145	138	13	[a]166	[a]155	143	[a]148	23	155	152	145	135
4		153	145	143	14	[a]165	155	145	[a]148	24	155	155	143	143
5		150	145	143	15	165	155	148	[a]148	25	156	152	140	143
6		150	145	145	16	160	155	150	148	26	155	150	143	145
7	170	152	143	145	17	160	153	150	148	27	155	150	140	145
8		[a]153	143	150	18	158	153	150	146	28	155	150	143	145
9	168	[a]153	145	153	19	156	150	150	145	29	155	150	143	145
10	[a]167	[a]154	145	150	20	155	150	145	145	30	155	148	143	145
										31	155	148	140	.....

[a] Interpolated.

NOTE.—Braced figures show estimated mean discharge for period indicated.

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Monthly discharge of Big Butte Creek below Butte Falls, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June	.....	155	163	9,700
July	158	148	152	9,350
August	150	140	145	8,920
September	153	135	145	8,630
The period	.....	.....	.....	36,600

SOUTH FORK OF LITTLE BUTTE CREEK NEAR DEADWOOD, OREG.

LOCATION.—In sec. 9, T. 38 S., R. 4 E., 1½ miles east of Deadwood, 4 miles east of Lilyglen, and 21 miles east of Ashland, Jackson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—Fragmentary records November 19, 1916, to May 31, 1918, when station was discontinued.

GAGE.—Lietz eight-day water-stage recorder on left bank. Barrett & Lawrence water-stage recorder used 1916 and 1917.

DISCHARGE MEASUREMENTS.—Made from foot log or by wading.

CHANNEL AND CONTROL.—Composed of gravel and boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded for period of record, from water-stage recorder, 0.84 foot at 4 p. m. April 24 (discharge, 17 second-feet); creek dry at times.

1916–1918: Maximum stage recorded, 2.08 feet at 2 a. m. June 19, 1917 (discharge, 60 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—None at present. Water can be diverted above station and stored in the proposed Beaver Creek reservoir.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent for period. Rating curve fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

Discharge measurements of South Fork of Little Butte Creek near Deadwood, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 28	J. B. Platt [a]	0.35	2.56
Apr. 7	C. Z. Boyden [a]	.60	8.75
7	.....do	.60	8.72

[a] Engineer, Medford Irrigation District.

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Daily discharge, in second-feet, of South Fork of Little Butte Creek near Deadwood, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.
1	3.0	13	14	11	2.4	12	11	21	5.2	13	8.1
2	3.2	13	15	12	2.4	12	10	22	6.0	14	7.8
3	3.6	12	15	13	2.4	12	9.9	23	6.9	15	6.9
4	3.6	11	15	14	2.4	11	11	24	8.1	16	6.6
5	3.2	11	14	15	3.4	11	11	25	10	16	6.6
6	3.0	10	14	16	3.6	12	10	26	10	15	6.3
7	3.0	9.6	13	17	4.0	12	9.6	27	9.6	15	7.5
8	3.0	9.9	13	18	4.4	12	9.0	28	10	15	7.5
9	2.8	12	13	19	4.4	12	8.4	29	11	14	6.9
10	2.8	12	12	20	5.0	12	8.1	30	12	14	6.0
								31	13	.....	5.4

Monthly discharge of South Fork of Little Butte Creek near Deadwood, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March	13	2.4	5.40	332
April	16	9.6	12.6	750
May	15	5.4	10.1	621
The period	.....	.....	.....	1,700

LITTLE BUTTE CREEK ABOVE EAGLE POINT, OREG.

LOCATION.—In sec. 31, T. 35 S., R. 1 E., at Bieberstedt's ranch, a quarter of a mile above intake of Eagle Point ditch and 3 miles east of Eagle Point, Jackson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 24, 1916, to September 30, 1918.

GAGE.—Vertical staff; low-water section nailed to stump on right bank; high-water section on left bank directly opposite: read by Carl Bieberstedt and Mrs. W. E. Butler.

CHANNEL AND CONTROL.—Bed composed of smooth gravel. Control is diversion dam of Eagle Point ditch, which may change occasionally.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.3 feet at 8 a. m. January 12 (discharge, 6,200 second-feet); minimum stage recorded, 1.50 feet July 28, and August 1 and 2 (discharge, 10 second-feet).

1916–1918: Maximum and minimum stages recorded in 1918. The flood of 1884 is said to have reached a stage of about 15 feet.

ICE.—No records during winter.

DIVERSIONS.—Rogue River Valley canal diverts water above the station, the record at Bradshaw drop showing about the quantity carried past the gage; also, the municipal water supply (about 7.5 second-feet) for Medford is diverted above. Several hundred acres are irrigated along the creek above the station. Eagle Point ditch diverts about 8 second-feet just below this station, but above the old station at Tronson's ranch.

REGULATION.—Water was being stored in Fish Lake reservoir from March 17 to about April 18 and released during August and September, (see record of stage of reservoir, page 120).

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ACCURACY.—Stage-discharge relation changed on January 12 and June 9. Rating curves used October 1 to January 11, January 12 to June 8, and June 26 to September 30 fairly well defined. Indirect method for shifting control, June 9–25. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent from October to May, and good for remainder of year.

Discharge measurements of Little Butte Creek above Eagle Point, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 9	R. P. Cowgill[a]	2.38	58.7	June 14	Batchelder and Cowgill	2.16	28.3
Dec. 20	do	2.90	128	July 1	R. P. Cowgill	1.90	19.7
Jan. 11	do	4.00	449	22	do	1.64	12.7
Mar. 15	Briggs and Cowgill	3.68	227	31	do	1.60	11.8
Apr. 12	R. P. Cowgill	3.00	202	Sept. 7	do	1.79	16.3
June 2	do	2.18	50	18	Batchelder and Rhodes	2.55	56

[a] Engineer, Rogue River Valley Canal Co.

Daily discharge, in second-feet, of Little Butte Creek above Eagle Point, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	62	60	530	96	205	205	220	130	48	18	10	15
2	59	60	178	89	235	205	220	131	47	17	10	16
3	55	67	112	83	205	235	270	131	47	17	11	16
4	55	66	94	90	177	270	252	131	37	17	11	14
5	55	90	86	90	252	235	220	142	33	17	11	14
6	58	78	83	89	1,150	220	191	131	26	17	15	14
7	59	94	83	128	580	220	191	115	21	18	16	16
8	59	90	78	285	350	235	205	111	22	16	15	18
9	55	89	72	240	290	310	220	153		17	17	24
10	46	86	71	137	252	270	220	205		17	15	28
									24			
11	46	82	70	318	270	235	205	121		17	14	30
12	59	91	71	2,600	730	395	220	100		17	14	32
13	55	86	89	580	730	350	220	95		17	14	32
14	55	83	112	1,150	610	270	220	102	30	17	16	33
15	56	82	97	495	395	235	220	111	.....	16	19	60
16	60	82	91	970	670	220	205	111		15	20	56
17	60	84	97	445	445	205	205	111		15	20	50
18	60	83	96	495	350	350	177	97		15	20	48
19	62	82	91	350	270	350	177	92		15	20	45
20	62	77	128	270	235	290	177	84		15	20	45
									24			
21	54	77	97	235	220	270	177	75		15	21	46
22	52	73	91	205	235	270	177	65		14	23	49
23	60	72	89	191	235	270	177	64		14	23	51
24	60	71	570	177	395	290	177	58		15	17	51
25	60	71	202	205	270	395	165	53		12	16	51
26	64	71	146	177	270	395	177	57	22	12	15	51
27	61	71	300	177	252	372	177	64	18	14	15	55
28	60	73	190	165	235	330	177	64	18	10	16	55
29	60	166	128	270	.....	310	165	70	18	11	17	56
30	60	370	112	220	.....	310	153	71	18	12	16	56
31	60	.....	104	165	.....	310	.....	58	.....	12	16	.....

NOTE.—Braced figures show estimated mean discharge for periods indicated.

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Monthly discharge of Little Butte Creek above Eagle Point, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	64	46	57.7	3,550
November	370	60	90.9	5,410
December	570	70	140	8,610
January	2,600	83	361	22,200
February	1,150	177	375	20,800
March	395	205	285	17,500
April	270	153	199	11,800
May	205	53	100	6,150
June	48	18	26.3	1,560
July	18	10	15.3	941
August	23	10	16.2	996
September	33	14	39.2	2,330
The year	2,600	10	141	102,000

DEAD INDIAN CREEK NEAR LILYGLEN, OREG.

LOCATION.—In NW. ¼ sec. 22, T. 38 S., R. 3 E., at Neill's ranch, 1 mile west of Lilyglen, a former post office, and 17 miles east of Ashland, Jackson County.

DRAINAGE AREA.—Not measured; no adequate maps available.

RECORDS AVAILABLE.—February 16 to May 25, 1916; October 19, 1916, to June 30, 1917; March 1 to May 31, 1918, when station was discontinued.

GAGE.—Lietz eight-day water-stage recorder; Stevens recorder used 1916 and 1917 in same location. Vertical staff on left bank, one-eighth mile upstream used until May, 1916; read by William Lindsay.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Closely packed clay; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during period from water-stage recorder, 0.72 foot at 6 p. m. March 31 (discharge, 29 second-feet); stream dry in summer.

1916–1918: Maximum stage recorded, 3.12 feet March 29, 1917 (discharge uncertain).

ICE.—Stage-discharge relation apparently affected by ice from March 5 to 9. Discharge estimated from observer's notes and temperature records.

DIVERSIONS.—None at present. Water can be diverted from a point about 1,500 feet above the gage into the proposed Beaver Creek reservoir.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 100 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting gage-height graph. Records good.

Discharge measurements of Dead Indian Creek near Lilyglen, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 2	J. B. Platt [a]	0.40	5.1
Apr. 5	L. Z. Boyden [a]	.54	15.7

[a] Engineer, Medford Irrigation District.

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Daily discharge, in second-feet, of Dead Indian Creek near Lilyglen, Oreg., for the year ending Sept. 30, 1918.

Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.
1.....	a 5.0	27.0	5.7	11.....	5.4	18.0	3.3	21.....	16.0	11.0	2.2
2.....	6.0	25.0	5.4	12.....	4.2	18.0	2.8	22.....	19.0	11.0	2.0
3.....	4.8	24.0	5.1	13.....	3.6	18.0	2.5	23.....	18.0	11.0	1.0
4.....	9.0	19.0	4.8	14.....	4.8	16.0	2.8	24.....	19.0	11.0	.5
5.....		18.0	4.5	15.....	6.0	13.0	2.5	25.....	25.0	11.0	1.0
6.....	12	17.0	4.2	16.....	5.4	13.0	2.5	26.....	24.0	10.0	1.5
7.....		16.0	3.9	17.....	7.5	11.0	2.5	27.....	25.0	8.4	2.0
8.....		17.0	3.9	18.....	12.0	10.0	2.2	28.....	23.0	7.2	1.8
9.....		19.0	4.5	19.....	13.0	10.0	2.2	29.....	25.0	6.6	1.0
10.....	11.0	18.0	4.2	20.....	13.0	10.0	2.2	30.....	25.0	6.0	.8
								31.....	27.0	.....	.5

a Estimated.

NOTE.—Braced figure shows estimated mean discharge for period indicated.

Monthly discharge of Dead Indian Creek near Lilyglen, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March	27	3.6	13.4	824
April	27	6.0	14.3	851
May	5.7	.5	2.77	170
The period				1,840

NOTE.—Total run-off for December, January, and February estimated as 1,100 acre-feet.

FISH LAKE RESERVOIR NEAR LAKE CREEK, OREG.

LOCATION.—At dam of Fish Lake reservoir, in SW. ¼ sec. 3 T. 36 S., R. 4 E., 18 miles east of Lake Creek post office, Jackson County.

RECORDS AVAILABLE.—December 8, 1915, to September 30, 1918.

GAGE.—Vertical staff on gate tower, gage graduated in feet and inches. Zero is at 4,799 feet, canal company datum, which is 2 feet below normal level of Fish Lake; read by G. H. Frey, J. E. Boyer, G. H. Snyder, and F. B. Frey.

METHOD OF COMPUTATION.—A table showing areas and capacities for various stages in the reservoir has been prepared from a survey made by the Medford Irrigation District in November, 1919. The contents of the reservoir at the end of each month and the net gain or loss during the month have been computed from records of stage by use of this table.

EXTREMES OF STAGE.—The maximum stages recorded each year are as follows: 1916, 17.54 feet, May 9 (contents, 4,020 acre-feet); 1917, 21.38 feet, June 4, at 8 a. m. (contents, 5,260 acre-feet); 1918, 9.26 feet, April 27 (contents, 1,520 acre-feet). Reservoir began filling about November 1, 1915, and was drawn down to natural lake level from October 15 to November 11, 1916, and from about October 5, 1917, to March 16, 1918.

COOPERATION.—Data furnished by Rogue River Valley Canal Co.

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Gage height and contents of Fish Lake reservoir near Lake Creek, Oreg., at end of each month for 1915–1918.

Month.	1915-16.			1916-17.			1917-18.		
	Gage height.	Contents.	Gain or loss.	Gage height.	Contents.	Gain or loss.	Gage height.	Contents.	Gain or loss.
	Feet.	*Acre-feet.*	*Acre-feet.*	*Feet.*	*Acre-feet.*	*Acre-feet.*	*Feet.*	*Acre-feet.*	*Acre-feet.*
October					0	−2,540		0	− 53
November			[a]+ 800	7.7	1,120	+1,120		0	0
December	8.83	1,410	+ 610	11.7	2,200	+1,080		0	0
January	10.83	1,950	+ 540	14.1	2,910	+ 710		0	0
February	12.18	2,330	+ 380	15.4	3,320	+ 410		0	0
March	13.75	2,810	+ 480	16.2	3,580	+ 260	6.46	828	+828
April	16.44	3,660	+ 850	16.8	3,780	+ 200	9.18	1,500	+672
May	16.81	3,780	+ 120	20.6	5,070	+1,290	9.08	1,470	− 30
June	16.81	3,780	0	7.8	1,145	−3,925	8.95	1,440	− 30
July	16.43	3,650	− 130	8.0	1,195	+ 50	9.16	1,490	+ 50
August	15.75	3,440	− 210	8.1	1,230	+ 35	7.79	1,140	−350
September	13.56	2,750	− 690	2.5	53	−1,170	4.54	418	−722
Year			+2,750			−2,499			+365

[a] Estimated.

NORTH FORK OF LITTLE BUTTE CREEK AT FISH LAKE, NEAR LAKE CREEK, OREG.

LOCATION.—In SW. ¼ sec. 3, T. 36 S., R. 4 E., at outlet of Fish Lake, 18 miles east of Lake Creek post office, Jackson County.

DRAINAGE AREA.—15 square miles.

RECORDS AVAILABLE.—October 21, 1914, to July 20, 1915; June 1 to November 5, 1916; and May 26, 1917, to September 30, 1918.

GAGE.—Vertical staff just above wasteway in temporary dam used during 1914 and 1915; vertical staff below permanent dam used from June 11, 1916, to July 10, 1918, when a Lietz water-stage recorder was installed; read by G. H. Frey, G. H. Snyder, T. G. Cowgill, and E. W. Frey.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Composed of gravel and boulders; shifting at intervals.

EXTREMES OF DISCHARGE.—1914–15: Maximum stage recorded, 0.34 foot. October 22 (discharge, 32 second-feet); minimum stage recorded 0.12 foot (discharge, 23 second-feet).

1916–1918: Maximum stage occurred in June, 1917, no record; minimum stage recorded 0.11 foot at 6 p. m. March 16, immediately after gates were shut, discharge, 5.2 second-feet.

ICE.—Stage-discharge relation seldom affected as lake is spring-fed.

DIVERSIONS.—None.

REGULATION.—Permanent dam at Fish Lake completed in fall of 1915; since completion record of storage in reservoir has been kept most of the time. (See above.)

ACCURACY.—1914–15: Stage-discharge relation probably permanent. Rating curve fairly well defined. Gage read to hundredths, from two to four times a month, Daily discharge ascertained by applying daily gage readings to rating curve. Monthly mean estimated, as springs give stream a uniform flow. Records fair.

1916–1918: Stage-discharge relation shifted during 1917, change assumed to have occurred during break in record, but may have come during high water in June. Rating curve for 1916, fairly well defined; for 1917 and 1918, well defined. Gage read to hundredths once daily until July 10, 1918, operation of water-stage recorder satisfactory thereafter. Daily discharge ascertained by applying to rating table the daily gage reading or the mean gage height obtained by inspecting recorder graph. Records good.

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Discharge measurements of North Fork of Little Butte Creek at Fish Lake, near Lake Creek, Oreg., during the years ending Sept. 30, 1915–1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914		*Feet.*	*Sec.-ft.*	1918		*Feet.*	*Sec.-ft.*
Oct. 21	Henshaw and Cowgill [a]	0.31	31.3	Oct. 7	R. P. Cowgill	0.96	30.4
22	do	.34	27.3	Nov. 18	do	1.08	43.7
22	do	.31	34.1	July 9	do	.65	21.9
1916				Sept. 12	do	.74	25.5
				16	Batchelder and Cowgill	.99	38.0
June 11	R. P. Cowgill	1.00	32.4	16	do	1.15	48.6
July 13	do	.96	27.8	17	do	.14	5.9
Sept. 9	do	.93	24.4	30	Cowgill and Dillard	1.57	77

[a] Chief engineer, Rogue River Valley Canal Co.

Daily discharge, in second-feet, of North Fork of Little Butte Creek at Fish Lake, near Lake Creek, Oreg., for 1915–1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1												
2			27					28				
3												
4										24		
5												
6												
7												
8												
9												
10												
11									27			
12												
13												
14			27					28				
15						26						
16				31								
17												
18												
19					28		27					
20		29								25		
21	30	29										
22	31	29										
23		29							23			
24		29										
25		28										
26		28	26									
27		27										
28		27	26	28	26							
29			26			30	28					
30		28										
31								27				

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Daily discharge, in second-feet, of North Fork of Little Butte Creek at Fish Lake, near Lake Creek, Oreg., for 1915–1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1916.												
1										30	27	27
2										30	27	27
3										30	27	27
4										30	27	27
5										30	27	27
6									32	30	27	26
7										30	27	26
8										30	27	26
9										29	27	26
10										29	27	26
11									31	29	27	26
12									31	29	27	26
13									31	29	27	26
14									31	29	27	26
15									30	29	27	26
16									30	29	27	27
17									30	30	27	27
18									30	30	27	26
19									30	30	27	26
20									30	30	27	26
21									30	30	27	26
22									30	30	27	51
23									30	30	27	58
24									30	30	27	58
25									30	28	27	58
26									30	28	27	58
27									30	28	27	64
28									30	28	27	61
29									30	28	27	61
30									30	28	27	61
31										27	27	
1916-17.												
1	61	30							42	48	45	51
2	61	29							42	51	45	51
3	61	29							42	54	45	51
4		30								54	45	54
5		27								51	45	54
6										51	42	54
7										51	45	54
8	136								283	50	42	54
9											42	54
10											42	54
11										39	45	54
12										39	45	54
13										39	45	54
14	68								23	39	42	54
15	40								34	36	42	54
16	34								65	39	42	54
17	35								98	39	42	54
18	36								98	39	45	54
19	34								86	42	45	54
20	32								82	45	42	54
21	31								68	48	42	54
22	30								65	48	39	58
23	30								54	45	39	58
24	30								65	45	39	54
25	30								65	48	39	54
26	30							39	65	45	39	54
27	29							39	65	42	39	51
28	30							42	62	42	39	45
29	30							42	62	42	39	42
30	30							42	62	42	39	39
31	30							42		42	45	

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Daily discharge, in second-feet, of North Fork of Little Butte Creek at Fish Lake, near Lake Creek, Oreg., for 1915–1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917–18.												
1	39	20	42	30	31	29	10	[a] 36	29	22	20	29
2	39	20	42	30	32	29	10	[a] 36	29	22	23	28
3	36	20	39	30	30	30	9.4	36	29	22	25	28
4	36	20	36	31	30	29	9.7	36	29	22	30	28
5	36	20	[a] 35	30	30	30	10	36	29	22	29	29
6	36	20	[a] 35	31	32	30	10	36	28	22	29	29
7	36	34	[a] 35	31	32	29	10	39	28	22	29	29
8	36	54	34	32	32	29	10	39	28	22	29	30
9	36	54	33	32	30	29	10	39	28	22	29	29
10	21	54	33	34	30	29	10	39	28	22	29	29
11	21	51	32	36	30	28	11	39	28	22	30	30
12	45	51	34	45	30	[a] 29	11	39	28	22	30	30
13	36	51	34	42	34	[a] 29	10	39	28	22	30	30
14	36	48	34	[a] 40	31	30	10	39	28	22	30	30
15	36	48	36	39	30	28	10		28	22	30	29
16	39	48	36	36	30	17	10		28	22	30	34
17	39	45	36	34	30	5.4	11		28	22	29	39
18	36	45	34	36	29	12	12		28	22	28	36
19	36	42	34	34	[a] 29	14	15	36	28	21	28	36
20	36	42	34	32	[a] 29	14	20		28	22	28	45
21		36	34	32	[a] 29	14	22		28	22	28	48
22		36	[a] 34	32	[a] 29	14	24		28	22	28	48
23		36	34	32	[a] 29	12	24	33	28	22	29	48
24		36	34	31	[a] 29	12	24	34	27	22	29	48
25	20	34	[a] 33	32	30	13	29	29	25	22	29	48
26		34	32	32	30	13	30	29	24	22	29	48
27		34	32	32	30	13	34	29	24	22	30	48
28	20	34	32	31	28	14	34	29	24	22	30	45
29	20	42	32	[a] 31	.....	10	34	29	23	21	30	45
30	20	42	32	32	.....	9.1	36	29	22	21	29	54
31	20	.....	32	32	.....	10	.....	29	.....	20	29	.....

[a] Interpolated.

NOTE.—Braced figures show estimated mean discharge for periods indicated. For October, 1916, June and July, 1917, mean discharge estimated from storage draft on reservoir, and natural flow before and after the periods of missing records.

Monthly discharge of North Fork of Little Butte Creek at Fish Lake, near Lake Creek, Oreg., for 1915-1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.		
	Maximum.	Minimum.	Mean.	Measured.	Storage.	Natural.
1914–1915.						
October	.....	.....	[a] 30	.....	.....	1,840
November	.....	.....	[a] 29	.....	.....	1,730
December	.....	.....	[a] 27	.....	.....	1,660
January	.....	.....	[a] 28	.....	.....	1,720
February	.....	.....	[a] 27	.....	.....	1,500
March	.....	.....	[a] 26	.....	.....	1,600
April	.....	.....	[a] 27	.....	.....	1,610
May	.....	.....	[a] 28	.....	.....	1,720
June	.....	.....	[a] 25	.....	.....	1,490
July	.....	.....	[a] 24	.....	.....	1,480
August	.....	.....	.....	.....	.....	.....
September	.....	.....	.....	.....	.....	.....
The period	.....	.....	.....	.....	.....	16,400
1916.						
June	.....	30	30.8	1,830	0	1,830
July	30	27	29.3	1,800	− 130	1,690
August	27	27	27.0	1,660	− 210	1,450
September	64	24	37.3	2,220	− 690	1,530
The period	.....	.....	.....	7,510	.....	6,500

[a] Estimated.

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Monthly discharge of North Fork of Little Butte Creek at Fish Lake, near Lake Creek, Oreg., for 1915–1918—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.		
	Maximum.	Minimum.	Mean.	Measured.	Storage.	Natural.
1916–1917.						
October		30	69.4	4,270	−2,540	1,730
November				[a] 680	+1,120	1,800
December				[a] 600	+1,080	1,680
January				[a] 1,170	+ 710	1,680
February				[a] 1,090	+ 410	1,500
March				[a] 1,240	+ 260	1,500
April				[a] 2,800	+ 200	3,000
May				[a] 2,310	+1,290	3,600
June		23	136	8,090	−3,920	4,070
July	54	36	45.0	2,770	+ 50	2,820
August	45	39	42.3	2,600	+ 35	2,640
September	58	39	52.7	3,140	−1,170	1,970
The year				30,800		28,000
1917–1918.						
October	45	20	30.0	1,840	− 53	1,790
November	54	20	38.4	2,280	0	2,280
December	42	32	34.5	2,120	0	2,120
January	45	30	33.4	2,050	0	2,050
February	34	28	30.2	1,680	0	1,680
March	30	5.4	20.4	1,250	+ 828	2,080
April	36	9.4	17.0	1,010	+ 672	1,680
May	39	29	35.0	2,150	− 30	2,120
June	29	22	27.3	1,620	− 30	1,590
July	22	20	21.8	1,340	+ 50	1,390
August	30	20	28.5	1,750	− 350	1,400
September	54	28	36.9	2,200	− 722	1,480
The year	54	5.4	29.4	21,300		21,700

[a] Estimated.

NOTE.—Natural flow obtained by applying to measured run-off the effect of storage in Fish Lake reservoir. No water stored during 1915. Mean discharge estimated as follows from comparison with discharge of other years: October 1, 1915, to March 31, 1916, 24 second-feet; April, 1916, 28 second-feet; May, 1916, 35 second-feet. Total run-off for year 18,900 acre-feet.

NORTH FORK OF LITTLE BUTTE CREEK NEAR LAKE CREEK, OREG.

LOCATION.—In sec. 21, T. 36 S., R. 2 E., one-eighth mile above intake of Rogue River Valley canal and 1 mile above Lake Creek post office, Jackson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 20 to October 13, 1916; May 7, 1917, to September 30, 1918. At station above city intake, about 3 miles above present station, September 10, 1911, to March 31, 1913 (gives discharge slightly greater than present station).

GAGE.—Stevens continuous water-stage recorder installed June 17, 1918, to replace vertical staff on right bank; used previously; read by I. C. Daly.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Composed of boulders and gravel; fairly permanent except in extreme floods.

EXTREMES OF DISCHARGE.—Maximum discharge during year, obtained from flood marks, 6.02 feet January 12 (discharge not computed); minimum stage recorded, 1.89 feet 4 p. m. July 25 (discharge, 24 second-feet.)

1916–1918: Maximum and minimum stages that of 1918.

ICE.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—Pipe line for water supply of city of Medford, capacity about 7.5 second-feet, carries water past the gage. Several hundred acres irrigated above the station.

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REGULATION.—Water stored in Fish Lake reservoir, 15 miles above station. (See page 120 for record of storage.)

ACCURACY.—Stage-discharge relation changed during high water. Two fairly well defined rating curves used during year, one from October 1 to January 11, and the other for remainder of year. Gage read to quarter-tenths once daily prior to May 10. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by applying to the rating tables, mean daily gage height obtained by inspecting recorder graph, or the daily gage reading. Records good.

Discharge measurements of North Fork of Little Butte Creek near Lake Creek, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 10	R. P. Cowgill[a]	1.92	33.0	June 17	C. L. Batchelder	2.03	39.6
Jan. 11	R. C. Briggs	2.44	141	Aug. 23	R. P. Cowgill	2.00	37.2
Mar. 15	Briggs and Cowgill	2.22	73	Sept. 18	do	2.13	54
Apr. 29	R. P. Cowgill	2.10	54.6				

[a] Chief engineer, Rogue River Valley Canal Co.

Daily discharge, in second-feet, of North Fork of Little Butte Creek near Lake Creek, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	60	43	114	46	70	74	[a]52	52		31		37
2	[a]60	[a]44	79	46	80	74	52	52		31	40	37
3	60	46	64	52	70	80	49	49		30		36
4	[a]61	43	60	52	70	90	44	52		29		36
5	[a]63	60	60	52	80	74	44	52		30	43	38
6	64	[a]75	60	52	192	70	40	52		29	48	38
7	[a]64	90	57	60	140	70	37	52		29	43	35
8	64	[a]87	57	122	102	90	37	52		30	43	
9	[a]64	84	57	102	90	102	37	56	40	33	42	
10	36	[a]77	57	70	74	90	37	56		33	40	40
11	[a]36	70	52	127	74	74	37			31	42	
12	84	[a]72	52	520	140	90	37			27	42	
13	[a]72	[a]73	68	168	127	90	37			29	38	44
14	60	[a]74	64	244	114	80	37			30	38	50
15	[a]62	[a]76	60	140	90	70	37			31	42	43
16	64	[a]78	62	228	90	70	37			33	42	[a]48
17	[a]67	79	60	119	90	52	37		38	33	42	[a]52
18	70	70	60	140	90	52	37		40	33	42	56
19	[a]65	[a]67	60	114	80	80	37		38	33	42	56
20	60	64	70	90	70	70	44		37	33	43	59
21	36	[a]67	60	80	70	70	44	47	36	35	35	68
22	[a]38	60	60	70	70	66	52		37	32	36	72
23	[a]40	[a]60	57	70	70	56	52		38	35	37	66
24	43	60	198	70	90	61	52		37	35	37	66
25	[a]43	60	[a]100	74	70	80	52		35	29	38	68
26	43	[a]60	60	70	[a]73	70	52		35	35	37	66
27	[a]43	60	60	70	[a]77	80	52		33		36	65
28	43	[a]60	64	66	80	70	52		31		35	65
29	[a]43	102	60	102	.....	61	61		31	35	36	63
30	43	230	57	90	.....	52	52		31		36	66
31	[a]43	.....	52	49	.....	52	.....		.....		37	.....

[a] Interpolated.

NOTE.—Braced figures show estimated mean discharge for periods indicated, based on records at Fish Lake.

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Monthly discharge of North Fork of Little Butte Creek near Lake Creek, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.		
	Maximum.	Minimum.	Mean.	Measured.	Storage.	Natural.
October	84	36	54.6	3,360	−53	3,310
November	230	43	73.0	4,340	0	4,340
December	198	52	67.8	4,170	0	4,170
January	520	46	108	6,640	0	6,640
February	192	70	90.5	5,030	0	5,030
March	102	52	72.9	4,480	+828	5,310
April	61	37	44.2	2,630	+672	3,300
May	56	.....	48.8	3,000	− 30	2,970
June	.....	31	37.9	2,260	− 30	2,230
July	35	27	32.1	1,970	+ 50	2,020
August	48	35	39.7	2,440	−350	2,090
September	72	35	51.1	3,040	−722	2,320
The year	520	27	59.9	43,400	+365	43,700

NOTE.—Natural flow obtained by applying to measured run-off the effect of storage in Fish Lake reservoir.

ROGUE RIVER VALLEY CANAL NEAR BROWNSBORO, OREG.

LOCATION.—In SW. ¼ sec. 8, T. 36 S., R. 1 E., at head of Bradshaw drop, 2 miles southwest of Brownsboro, 8 miles below intake, and 16 miles from Medford, Jackson County.

RECORDS AVAILABLE.—Irrigation seasons of 1913 and 1915 to 1918.

GAGE.—Stevens eight-day water-stage recorder installed April 24, 1918, and referred to vertical staff just at head of drop, installed June 5, 1916. Former gages were a few feet upstream.

DISCHARGE MEASUREMENTS.—Made by wading or from a plank.

CHANNEL AND CONTROL.—Composed of solid rock at head of drop; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during season, 2.06 feet 1 p. m. August 17 (discharge, 36 second-feet). Canal dry during winter.

1913 and 1915–1918: Maximum discharge was 41 second-feet June 19 to August 20, 1917 (gage height, 2.0 feet). Canal dry at times.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined. Operation of recorder fairly satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

Rogue River Valley canal diverts water from North Fork of Little Butte Creek in SE. ¼ sec. 22, T. 36 S., R. 2 E., to irrigate land lying in the basin of Bear Creek. Any seepage or return water from irrigation of about 300 acres above this point reaches Little Butte Creek above the station above Eagle Point.

Discharge measurements of Rogue River Valley canal near Brownsboro, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 10	R. P. Cowgill [a]	0.65	3.82	Aug. 5	J. B. Platt [b]	1.90	27.5
Apr. 24	.....do	1.71	21.0	23	R. P. Cowgill	1.84	27.5
June 2	.....do	1.83	28.5	Sept. 5	.....do	1.84	26.6
14	Batchelder and Cowgill	1.82	26.2	22	.....do	1.60	17.9
July 31	R. P. Cowgill	1.80	23.7				

[a] Chief engineer, Rogue River Valley Canal Co. [b] Engineer, Medford Irrigation District.

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Daily discharge, in second-feet, of Rogue River Valley canal near Brownsboro, Oreg., for the period from Apr. 24 to Oct. 16, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	a 26	27	21	25	28	32
2	.....	26	25	21	23	27	24
3	.....	25	27	20	22	27	16
4	.....	24	28	20	24	26	12
5	.....	24	28	19	a 26	26	12
6	.....	25	29	16	a 28	25	12
7	.....	26	a 29	a 19	a 30	23	11
8	.....	27	29	a 22	32	23	10
9	.....	27	28	24	34	27	10
10	.....	a 28	27	27	34	27	9.5
11	.....	29	26	27	34	26	9.2
12	.....	27	23	22	a 32	25	9.0
13	.....	27	26	22	30	25	9.0
14	.....	27	26	27	29	14	9.0
15	.....	28	26	26	33	a 16	9.0
16	.....	28	27	27	34	a 17	10
17	.....	27	24	a 28	35	19	.....
18	.....	27	26	30	34	16	.....
19	.....	27	25	29	a 34	19	.....
20	.....	26	24	27	34	21	.....
21	.....	25	23	27	32	21	.....
22	.....	26	25	27	25	a 21	.....
23	.....	23	25	26	26	a 21	.....
24	22	a 22	25	27	28	21	.....
25	25	20	24	27	29	a 21	.....
26	28	23	24	27	29	21	.....
27	14	25	25	27	28	17	.....
28	27	27	22	27	27	16	.....
29	26	24	21	21	26	16	.....
30	a 26	29	21	24	a 28	a 16	.....
31	.....	a 28	.....	24	29	.....	.....

a Interpolated.

NOTE.—Canal dry from October 1, 1917, to some time in April, 1918, probably a few days before the record began.

Monthly discharge of Rogue River Valley canal near Brownsboro, Oreg., for the period from Apr. 24, to Oct. 16, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 24-30	28	14	24.0	333
May	29	20	25.9	1,590
June	29	21	25.5	1,520
July	30	16	24.5	1,510
August	35	22	29.5	1,810
September	28	14	21.6	1,290
October 1-16	32	9	12.7	403
The period	.....	.....	.....	8,460

BEAR CREEK AT MEDFORD, OREG.

LOCATION.—In NW. ¼ sec. 30, T. 37 S., R. 1 W., just above Main Street Bridge in Medford, Jackson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 13, 1915, to June 30, 1918; fragmentary.

GAGE.—Vertical staff at southeast corner of Page theater building, on left bank; read by R. P. Cowgill.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of loose gravel; a concrete sewer passing under creek forms a partial control which shifts during high water.

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Extremes of discharge.—Maximum stage recorded during year, 3.80 feet at 8 and 10 a. m. January 12 (discharge, 655 second-feet); stream practically dry in latter part of summer owing to diversions above.

1915–1918: Maximum stage recorded, 4.75 feet at 8 a. m. February 10, 1916 (discharge, 1,240 second-feet); stream practically dry in latter part of 1918.

Ice.—Stage-discharge relation not affected by ice.

Divisions.—A large area above station is irrigated from flood waters of Bear Creek.

Regulation.—None.

Accuracy.—Stage-discharge relation changed during flood of January 12. Two rating curves both well defined, used during year; one from November 27 to January 11, and other for remainder of year. Gage read to hundredths once daily with two readings during periods of considerable fluctuation. Daily discharge ascertained by applying daily gage height to rating table. Records good except during October, November, and June for which they are approximate.

Discharge measurements of Bear Creek at Medford, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 1	Briggs and Cowgill [a]	2.26	127	Mar. 14	J. B. Platt [b]	2.11	105
20	R. P. Cowgill	1.70	27.0	23	R. P. Cowgill	2.32	152
Jan. 12	R. C. Briggs	3.76	637	Apr. 30	Cowgill and Platt	1.72	35.9
Feb. 7	R. P. Cowgill	2.70	273	May 16	R. P. Cowgill	1.50	14.4
11	do	2.03	89	June 29	do	1.10	[c] .1
18	do	2.20	126	July 15	do	1.04	[c] .05
Mar. 14	Briggs and Cowgill	2.13	104				

[a] Chief engineer, Rogue River Valley Canal Co. [b] Engineer, Medford Irrigation District. [c] Estimated.

Daily discharge, in second-feet, of Bear Creek at Medford, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1			142	28	47	121	138	30	9.0
2			[a] 90	27	44	128	128	25	9.0
3			[a] 37	25	40	140	112	24	8.2
4			[a] 33	26	40	99	105	23	5.8
5			[a] 29	27	86	95	101	28	4.1
6			25	25	382	86	95	27	4.1
7			[a] 24	27	298	90	90	24	5.0
8			22	25	171	97	86	21	[a] 4.3
9			[a] 22	[a] 26	126	99	119	25	[a] 3.6
10			[a] 21	27	103	101	117	34	2.9
11			[a] 20	27	90	103	105	32	2.6
12			19	400	121	128	103	26	
13			[a] 22	100	130	121	108	25	2.0
14			25	204	155	108	101	18	
15		1.0	22	126	136	103	92	16	
16	1.0		22	166	126	108	90	14	
17			22	140	138	126	86	14	
18			22	126	126	190	82	14	1.0
19			23	95	97	190	78	14	
20			[a] 24	[a] 79	88	160	74	14	
21			26	63	84	145	74	12	
22			22	60	103	158	74	12	.5
23			22	57	126	158	67	10	
24			50	53	150	158	61	9	
25			39	50	112	190	63	9	.1
26			33	47	128	176	57	9	
27			56	47	136	166	55	12	
28		5	42	47	100	155	46	12	.1
29		46	39	44	.....	145	43	12	
30		46	33	53	.....	150	33	11	
31		.....	29	46	.....	150	.....	10	.....

[a] Interpolated.

Note.—Braced figures show estimated mean discharge for periods indicated.

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Monthly discharge of Bear Creek at Medford, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October			1.0	61
November	46		4.1	244
December	142	19	34.1	2,100
January	400	25	74.0	4,550
February	382	40	127	7,050
March	190	86	133	8,180
April	138	33	86.1	5,120
May	34	9	18.3	1,130
June	9.0	.1	2.48	148
The period				28,600

PHOENIX DITCH AT TALENT, OREG.

LOCATION.—In NW. ¼ sec. 23, T. 38 S., R. 1 W., a quarter of a mile below old bridge across Bear Creek and half a mile north of Talent, Jackson County.

RECORDS AVAILABLE.—April 19, 1916, to September 30, 1918.

GAGE.—Barrett & Lawrence water-stage recorder on right bank installed May 5, 1917, and referred to vertical staff on left of flume about 80 feet below intake used previously; inspected by R. P. Cowgill.

DISCHARGE MEASUREMENTS.—Made from collar of flume.

CHANNEL AND CONTROL.—Flume extends only a few feet below gage; no defined control.

EXTREMES OF DISCHARGE.—Maximum stage for period of record, from water-stage recorder, 1.75 feet at 8 a. m. May 27 (discharge, 22 second-feet.) Canal dry in winter.

ACCURACY.—Stage-discharge relation shifting. Three rating curves used as follows: May 4 to 25, well defined; June 6 to 12, fairly well defined; June 14 to July 15, fairly well defined. Indirect method for shifting control used from May 26 to June 5 and June 13. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records for May good, and for June and July, fair.

The Phoenix ditch diverts water from Bear Creek in NW. ¼ sec. 23, T. 38 S., R. 1 W., for irrigation of about 1,000 acres of land between Medford and Talent.

Discharge measurements of Phoenix ditch at Talent, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 4	R. P. Cowgill[a]	1.47	16.8	June 12	R. P. Cowgill	1.36	8.9
15	do	1.42	16.2	14	Batchelder and Cowgill	1.54	11.8
25	do	1.52	18.0	18	R. P. Cowgill	1.18	3.6
June 6	do	1.67	17.7	July 1	do	.90	1.0
10	Cowgill and Platt	1.54	13.3	15	do	.74	.4

[a] Chief engineer, Rogue River Valley Land Co.

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Daily discharge, in second-feet, of Phoenix ditch at Talent, Oreg., for the year ending Sept. 30, 1918.

Day.	May.	June.	July.	Day.	May.	June.	July.	Day.	May.	June.	July.
1		14	1.0	11	17	12	.6	21	16	3.2	
2		13	.8	12	17	10	.6	22	14	2.3	
3		12	.9	13	16	14	.3	23	14	2.4	
4	17	12	.8	14	18	9.5	.1	24	15	3.9	
5	19	11	.6	15	17	10	.1	25	15	2.9	
6	19	16	.6	16	17	6.9		26	19	2.4	
7	18	14	.5	17	17	6.4		27	20	2.2	
8	17	12	.6	18	17	3.3		28	19	1.2	
9	17	12	.7	19	16	2.6		29	18	1.0	
10	17	12	.8	20	16	2.9		30	16	1.0	
								31	16		

NOTE.—Flow in canal started about April 20; no record prior to May 4. No flow subsequent to July 15.

Monthly discharge of Phoenix ditch at Talent, Oreg., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 4-31	20	14	16.9	939
June	16	1.0	7.61	453
July 1-15	1.0	.1	.60	18
The period				1,410

COQUILLE RIVER BASIN.

SOUTH FORK OF COQUILLE RIVER AT POWERS, OREG.

LOCATION.—In SW. ¼ sec. 13, T. 31 S., R. 12 W., a quarter of a mile due west of Powers post office, Coos County, at present terminus of Marshfield branch of Southern Pacific Railroad. Salmon Creek enters 1,000 feet above and Bingham Creek 200 feet below station.

DRAINAGE AREA.—168 square miles (measured on topographic map and on Douglas County Abstract Co.'s map).

RECORDS AVAILABLE.—September 4, 1916, to September 30, 1918.

GAGE.—Inclined staff in three sections on left bank under footbridge; read by L. F. Brown.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—Composed of gravel and solid rock; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.8 feet at 4.30 p. m. February 6 (discharge, 10,200 second-feet); minimum stage recorded, 2.38 feet September 26 and 28 (discharge, 18 second-feet).

1916–1918: Maximum and minimum stages, those of 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation shifted during high water of January. Two rating curves used, both well defined for low stages and fairly well for high by measurement made February 17, 1919. Gage read to hundredths once daily, and twice in case of very high water. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

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Discharge measurements of South Fork of Coquille River at Powers, Oreg., during the year ending Sept. 30, 1918.

[Made by C. L. Batchelder.]

Date.		Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 12		2.95	67
Sept. 12		2.43	18.7

Daily discharge, in second-feet, of South Fork of Coquille River at Powers, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	31	27	5,350	800	1,170	870	870	[a]225	93	38	27	18
2	31	27	[a]3,360	730	2,550	870	730	225	93	38	26	18
3	31	266	1,360	730	1,560	1,090	600	195	93	36	24	18
4	30	116	940	1,170	3,670	940	500	195	93	36	26	18
5	30	385	600	800	4,450	940	455	195	75	36	26	18
6	29	200	550	730	3,650	800	415	195	75	36	24	18
7	29	93	500	870	4,060	730	[a]182	195	75	36	24	18
8	28	75	455	870	2,550	660	550	165	75	36	24	19
9	27	61	375	870	1,760	1,460	2,090	[a]212	75	34	24	19
10	27	32	335	730	1,360	2,090	1,360	260	75	34	24	19
11	27	61	295	730	1,260	2,430	1,010	195	75	34	20	18
12	27	343	295	4,450	1,260	2,310	940	[a]180	75	34	20	18
13	27	284	335	2,670	1,660	1,660	800	165	59	32	20	41
14	27	170	550	3,540	2,090	1,260	730	[a]156	59	32	20	36
15	28	93	660	2,910	[a]2,820	1,090	660	[a]148	59	29	27	36
16	28	61	2,550	2,310	3,540	1,090	600	140	59	29	32	34
17	28	61	4,750	2,200	3,030	1,460	[a]550	140	59	29	27	[a]27
18	28	61	2,550	2,310	2,200	2,430	500	165	59	29	27	20
19	27	[a]58	1,980	1,760	1,560	1,760	500	165	46	29	26	20
20	27	56	1,980	1,360	1,090	1,260	500	165	46	27	26	19
21	27	50	1,360	1,260	940	1,170	455	165	46	27	21	18
22	27	50	1,010	870	870	2,430	415	140	46	27	21	18
23	27	50	3,030	560	1,170	2,790	375	140	46	[a]32	20	18
24	27	45	2,430	550	1,170	2,670	375	140	46	36	20	18
25	27	45	[a]4,940	550	1,170	2,550	335	115	44	36	20	18
26	27	44	7,450	550	1,170	1,870	295	115	44	36	20	18
27	27	44	3,800	550	1,090	1,560	295	115	[a]44	36	20	18
28	27	116	3,540	455	940	1,170	260	115	44	34	20	18
29	27	3,410	2,430	660	.....	1,170	260	115	41	29	19	18
30	27	8,050	1,560	660	.....	1,170	225	115	41	27	18	18
31	27	.....	1,090	660	.....	1,010	.....	93	.....	27	18	.....

[a] Interpolated.

Monthly discharge of South Fork of Coquille River at Powers, Oreg., for the year ending Sept. 30, 1918.

[Drainage area, 168 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	31	27	27.9	0.166	0.19	1,720
November	8,050	27	481	2.88	3.21	28,600
December	7,450	295	2,010	12.0	13.83	124,000
January	4,450	455	1,290	7.68	8.86	79,300
February	8,650	870	2,170	12.9	13.43	121,000
March	2,790	660	1,510	8.99	10.36	92,800
April	2,090	225	604	3.60	4.02	35,900
May	260	93	163	.970	1.12	10,000
June	93	41	62.0	.369	.41	3,690
July	38	27	32.6	.194	.22	2,000
August	32	18	22.9	.136	.16	1,410
September	41	18	21.1	.126	.14	1,260
The year	8,650	18	692	4.12	55.95	502,000

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TENMILE CREEK BASIN.

CLEAR LAKE OUTLET NEAR REEDSPORT, OREG.

LOCATION.—In NW. ¼ sec. 30, T. 22 S., R. 12 W., at outlet of Clear Lake, 8 miles southwest of Reedsport, Douglas County.

DRAINAGE AREA.—About 4 square miles (measured on large scale county map).

RECORDS AVAILABLE.—July 21, 1917, to May 16, 1918.

GAGE.—Stevens eight-day water-stage recorder; inspected by F. P. Mallory.

CONTROL.—Cippoletti weir, 10-foot crest, with knife edges. (Rating not checked with current meter.)

EXTREMES OF DISCHARGE.—Maximum height over weir during period from water-stage recorder 2.07 feet, Dec. 23 (discharge, 100 second-feet); minimum stage from recorder 0.25 foot (discharge, 4.2 second-feet).

DIVERSIONS.—None.

REGULATION.—Run-off is considerably retarded by natural storage in Clear Lake.

ACCURACY.—Operation of water-stage recorder satisfactory October to April, somewhat unsatisfactory at times during July to September. Cippoletti weir formula used without allowance for velocity of approach, which is believed to give quite accurate results. Daily discharge ascertained by applying to weir formula mean daily gage height obtained by inspecting recorder graph.

COOPERATION.—Base data furnished by J. G. Kelley, hydraulic engineer.

Daily discharge, in second-feet, of Clear Lake outlet near Reedsport, Oreg., for the period July 21, 1917, to May 16, 1918.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1	.....	12	4.5		8.5	a 52	79	57	64	a 49	.....
2	.....	12	4.2	10	8.2	a 62	74	59	62	a 49	.....
3	.....	12	4.2		8.5	a 72	74	58	63	48	.....
4	.....	12	4.2	9.8	9.2	71	75	61	64	46	.....
5	.....	11	5.5	10	9.8	66	72	63	63		
6	.....	11	5.8	10	11	62	70	a 67	61	47	.....
7	.....	11	7.9	10	12	58	69	71	59		
8	.....	9.5	a 10	a 11	13	55	68	69	58	48	.....
9	.....	9.5	a 12	12	13	53	66	66		50	.....
10	.....	9.8	14	13	14	50	64	65	58	49	43
11	.....	8.8	15	13	15	49	69	65		49	41
12	.....	8.8	16	13	19	48	80	68		49	40
13	.....	8.8	18	13	18	58	80	69	58	50	40
14	.....	8.8	18	12	a 18	66	81	69	57	51	40
15	.....	8.0	18	11	19	68	80	71	56	51	41
16	.....	7.3	a 16	11	19	71	79	86	55	51	41
17	.....	7.6	15	11	19	73	79	92	54	50	.....
18	.....	7.3	15	11	19	74	77	90	55	50	.....
19	.....	7.0	14	10	18	81	73	85	53	49	.....
20	.....	7.3	14	11	18	89	69	80		48	.....
21	13	7.9	14	10	18	85	66	75	54	48	.....
22	13	7.6	13	10	18	81	64	71		47	.....
23	14	7.3	15	10	18	97	61	72		46	.....
24	13	6.7	14	10	18	99	60	71		46	.....
25	13	5.8	15	10	18	97	59		54	46	.....
26	12	5.8	15	10	18	95	58	68	55	45	.....
27	12	5.5	10	10	20	94	57		54	45	.....
28	13	4.7	12	10	27	89	57	66	53		.....
29	14	4.5	11	10	a 35	84	59	.....	52	45	.....
30	13	5.0	10	10	a 43	84	59	.....	51		.....
31	13	4.5	.....	9.2	.....	82	57	.....	50	.....	.....

a Interpolated.

NOTE.—Braced figures show estimated mean discharge for periods indicated.

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Monthly discharge of Clear Lake outlet near Reedsport, Oreg., for the period July 21, 1917, to May 16, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July 21-31	14	12	13.0	284
August	12	4.5	8.22	505
September	18	4.2	12.0	714
October	13	9.2	10.7	658
November	43	8.2	17.4	1,040
December	99	48	73.1	4,490
January	81	57	68.9	4,240
February	92	57	70.4	3,910
March	64	50	56.5	3,470
April	51	45	47.9	2,850
The period				22,200

NOTE.—Mean discharge for May estimated as 35 second-feet, for June, 20 second-feet, for year ending June 30, 36.1 second-feet, or 9.25 second-feet per square mile, giving 126 inches depth of run-off on drainage area of 4 square miles.

UMPQUA RIVER BASIN.

UMPQUA RIVER NEAR ELKTON, OREG.

LOCATION.—In sec. 8, T. 23 S., R. 7 W., at ferry crossing 4 miles south (by road) from Elkton, Douglas County, and 8 miles (by river) above Elk Creek.

DRAINAGE AREA.—3,680 square miles.

RECORDS AVAILABLE.—October 18, 1905, to December 31, 1906; May 12, 1907, to September 30, 1918.

GAGE.—Staff in five sections; low-water section inclined, the others vertical; read by D. C. Higginbotham. Datum lowered 0.52 foot September 2, 1910.

DISCHARGE MEASUREMENTS.—Made from car on ferry cable 100 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel; somewhat shifting. Rock control; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.0 feet at 7 a. m. January 13 (discharge, 67,000 second-feet); minimum stage recorded, 0.17 foot August 9 to 15, 28 to 31, and September 1 to 9 (discharge, 930 second-feet).

1905–1918: Maximum stage recorded, 38.5 feet (present datum) at 7 a. m. November 23, 1909 (discharge, estimated from extension of rating curve, 163,000 second-feet); minimum stage recorded that of 1918.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Practically none.

REGULATION.—Practically none.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of Umpqua River near Elkton, Oreg., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 18	R. C. Briggs	10.95	29,000
Sept. 10	C. L. Batchelder	.27	1,020

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Daily discharge, in second-feet, of Umpqua River near Elkton, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,180	1,070	37,100	9,900	11,100	11,100	15,000	5,630	3,290	1,240	1,120	930
2	1,180	1,070	28,000	9,100	10,200	9,600	13,800	5,260	2,990	1,300	1,120	930
3	1,180	1,070	13,200	8,600	9,600	9,350	12,300	4,900	2,690	1,360	1,120	930
4	1,180	1,120	9,100	10,200	10,800	10,200	10,800	5,820	2,690	1,300	1,120	930
5	1,180	1,420	8,360	10,800	19,900	11,400	9,600	6,600	2,990	1,240	1,020	930
6	1,180	1,360	6,800	9,600	41,100	10,200	8,120	6,800	2,690	1,360	1,020	930
7	1,180	1,660	6,010	9,600	55,800	9,600	7,660	6,400	2,690	1,300	1,020	930
8	1,180	1,720	5,260	11,700	33,100	10,200	7,220	6,800	2,690	1,180	1,020	930
9	1,180	1,480	4,560	13,800	24,400	12,000	8,120	6,800	2,410	1,120	930	930
10	1,180	1,420	4,230	15,000	21,300	17,400	9,350	6,200	2,150	1,120	930	1,020
11	1,180	1,360	3,590	15,700	17,800	18,500	12,000	5,630	1,900	1,120	930	1,180
12	1,180	1,360	2,990	28,700	14,700	15,700	11,100	5,260	1,900	1,120	930	1,070
13	1,180	1,600	2,690	58,000	12,600	13,800	9,100	5,080	2,150	1,120	930	1,020
14	1,180	1,720	4,230	37,100	18,800	12,600	8,600	4,560	2,150	1,120	930	1,020
15	1,180	1,480	12,600	41,900	20,200	11,400	8,120	4,390	1,840	1,120	930	1,070
16	1,180	1,300	11,400	32,300	20,600	10,800	8,600	4,560	1,780	1,120	1,070	960
17	1,180	1,300	9,600	29,900	22,400	10,800	9,100	5,260	1,540	1,120	1,300	960
18	1,070	1,180	17,100	28,700	20,200	13,200	8,850	4,900	1,420	1,120	1,480	960
19	1,070	1,120	17,400	27,600	18,500	18,500	8,600	4,560	1,300	1,120	1,360	960
20	1,070	1,070	15,000	21,300	17,100	17,800	8,600	4,560	1,120	1,120	1,180	960
21	1,070	1,070	12,300	19,200	14,700	15,700	9,100	4,900	1,300	1,120	1,120	960
22	1,070	1,120	11,100	16,400	12,900	14,400	8,260	4,900	1,240	1,120	1,070	960
23	1,070	1,300	10,800	14,700	13,800	14,700	7,660	4,560	1,180	1,300	1,020	960
24	1,070	1,120	13,200	12,900	16,800	17,100	7,890	4,230	1,120	1,480	1,020	960
25	1,070	1,070	13,800	11,700	16,000	18,500	8,600	4,230	1,180	1,300	1,020	960
26	1,070	1,180	15,000	10,800	14,400	16,400	8,120	3,910	1,300	1,240	1,020	960
27	1,070	1,240	21,300	10,200	12,900	14,700	7,220	3,910	1,240	1,240	1,020	960
28	1,070	1,480	18,500	11,400	12,000	13,200	6,800	3,590	1,300	1,240	930	960
29	1,070	1,660	15,700	12,600	.....	12,900	6,400	3,290	1,420	1,120	930	960
30	1,070	15,000	13,800	13,200	.....	14,400	6,010	3,590	1,300	1,120	930	960
31	1,070	.....	12,000	12,000	.....	14,700	.....	3,290	.....	1,120	930	.....

Monthly discharge of Umpqua River near Elkton, Oreg., for the year ending Sept. 30, 1918.

[Drainage area, 3,680 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	1,180	1,070	1,130	0.307	0.35	69,500
November	15,000	1,070	1,770	.481	.54	105,000
December	37,100	2,690	12,200	3.32	3.83	750,000
January	58,000	8,600	18,500	5.03	5.80	1,140,000
February	55,800	9,600	19,100	5.19	5.40	1,060,000
March	18,500	9,350	13,600	3.69	4.25	836,000
April	15,000	6,010	9,030	2.45	2.73	537,000
May	6,800	3,290	4,980	1.35	1.56	306,000
June	3,290	1,120	1,900	.516	.58	113,000
July	1,480	1,120	1,200	.326	.38	73,800
August	1,480	930	1,050	.285	.33	64,600
September	1,180	930	972	.264	.29	57,800
The year	58,000	930	7,050	1.92	26.04	5,110,000

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NORTH UMPQUA RIVER NEAR GLIDE, OREG.

LOCATION.—In SW. ¼ sec. 13, T. 26 S., R. 4 W., at Hughes ferry, 2 miles below Glide, Douglas County, just off main road to Roseburg.

DRAINAGE AREA.—1,210 square miles (measured on topographic and Forest Service maps).

RECORDS AVAILABLE.—September 1, 1915, to September 30, 1918.

GAGE.—Vertical staff on left bank just below ferry landing; read by J. H. Hayes.

DISCHARGE MEASUREMENTS.—Made from ferry up to a stage of about 6 feet. Flood measurements have been made from the bridge at Winchester, about 20 miles downstream, and the inflow, estimated from measurements of Oak Creek, deducted.

CHANNEL AND CONTROL.—Composed of solid rock; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.9 feet at 8 a. m. January 12 (discharge, 42,500 second-feet); minimum stage recorded, 0.20 foot September 20 to 30 (discharge, 850 second-feet).

1915–1918: Maximum stage recorded, that of 1918; minimum stage recorded, 0.05 foot October 1, 2, 7 to 13, and 18 to 22, 1915 (discharge, 750 second-feet).

Maximum stage in many years occurred during night of November 22, 1909; gage height 22 feet as determined by leveling to well-defined high-water marks on September 1, 1917 (discharge, estimated from extension of rating curve, 90,000 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 10,000 second-feet. Gage read to quarter or half tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of North Umpqua River near Glide, Oreg., during the year ending Sept. 30, 1918.

[Made by C. L. Batchelder.]

Date.		Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 13		1.18	1,950
Sept. 11		.30	926

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Daily discharge, in second-feet, of North Umpqua River near Glide, Oreg., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,020	980	8,350	3,100	4,700	4,320	3,610	3,100	2,150	1,220	1,020	930
2	1,020	1,070	3,610	2,780	4,700	5,100	4,510	3,100	2,150	1,220	1,020	930
3	1,020	1,170	2,940	2,620	4,320	5,100	3,960	3,100	2,000	1,220	1,020	930
4	980	1,220	2,460	5,500	4,700	5,100	3,610	3,270	1,930	1,220	1,020	930
5	980	1,280	1,860	4,510	15,600	4,320	3,440	3,270	2,080	1,220	1,020	930
6	980	1,170	1,790	4,140	18,800	3,780	3,270	3,100	2,220	1,220	1,020	930
7	980	1,170	1,930	6,100	15,300	3,610	3,270	2,780	2,220	1,220	1,020	930
8	980	1,070	1,650	7,600	13,200	3,270	3,270	2,780	2,150	1,220	1,020	930
9	980	1,020	1,650	8,350	7,850	3,610	4,140	3,440	2,080	1,220	1,020	1,020
10	980	980	1,520	6,350	5,900	3,960	4,140	3,270	2,000	1,170	1,020	980
11	980	980	1,450	7,850	5,500	4,510	3,960	3,100	2,000	1,170	1,020	930
12	980	1,280	1,390	29,700	5,100	5,300	3,610	3,100	2,000	1,120	1,020	930
13	980	1,120	1,860	13,900	6,350	4,700	3,610	3,100	2,000	1,120	1,020	930
14	980	1,070	6,100	16,700	5,500	4,140	3,610	3,270	1,930	1,120	1,070	930
15	980	1,070	6,600	15,300	5,100	4,320	3,610	3,100	1,720	1,120	1,280	930
16	980	1,020	4,320	13,900	4,900	4,900	4,140	2,940	1,580	1,120	1,220	930
17	980	980	10,900	12,800	5,900	5,500	4,320	3,100	1,580	1,120	1,120	890
18	980	980	8,100	15,600	5,100	8,850	3,960	3,270	1,520	1,120	1,120	890
19	980	980	5,900	13,600	4,700	7,350	4,140	3,100	1,520	1,120	1,120	850
20	980	980	7,100	7,350	4,140	5,900	3,960	2,940	1,450	1,120	1,070	850
21	980	980	4,900	5,900	3,610	5,100	3,960	2,780	1,450	1,120	1,070	850
22	980	980	4,320	5,100	3,610	5,900	4,140	2,620	1,450	1,120	1,020	850
23	980	980	14,600	3,960	4,140	7,850	3,610	2,460	1,390	1,220	1,020	850
24	980	980	10,300	3,960	4,900	7,350	3,610	2,460	1,390	1,220	1,020	850
25	980	980	6,350	5,100	4,510	9,400	3,270	2,460	1,390	1,170	1,020	850
26	980	980	6,850	4,700	4,320	7,350	3,440	2,220	1,220	1,170	980	850
27	980	980	7,600	4,140	4,140	6,350	3,270	2,460	1,220	1,120	980	850
28	980	1,120	6,350	3,610	3,960	5,500	3,270	2,460	1,220	1,120	980	850
29	980	7,850	5,100	7,850	.....	5,500	3,100	2,380	1,220	1,070	930	850
30	980	16,400	4,320	5,900	.....	6,100	3,100	2,300	1,280	1,070	930	850
31	980	.....	3,610	5,900	.....	5,100	.....	2,220	.....	1,020	930	.....

Monthly discharge of North Umpqua River near Glide, Oreg., for the year ending Sept. 30, 1918.

[Drainage area, 1,210 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	1,020	980	984	0.813	0.94	60,500
November	16,400	980	1,790	1.48	1.65	107,000
December	14,600	1,390	5,030	4.16	4.80	309,000
January	29,700	2,620	8,170	6.75	7.78	502,000
February	18,800	3,610	6,450	5.33	5.55	358,000
March	9,400	3,270	5,460	4.51	5.20	336,000
April	4,510	3,100	3,700	3.06	3.41	220,000
May	3,440	2,220	2,870	2.37	2.73	176,000
June	2,220	1,220	1,720	1.42	1.58	102,000
July	1,220	1,020	1,160	.959	1.11	71,300
August	1,280	930	1,040	.860	.99	64,000
September	1,020	850	900	.744	.83	53,600
The year	29,700	850	3,270	2.69	36.57	2,360,000

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MISCELLANEOUS DISCHARGE MEASUREMENTS.

Records of measurements of the flow of streams at points other than those at which gaging stations were maintained are presented in the following tables:

Miscellaneous discharge measurements in lower Columbia River and Pacific slope drainage basins during the year ending Sept. 30, 1918.

Umatilla River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
June 5	Umatilla River	Columbia River	Below Yoakum reservoir	1.35	254
July 15	do	do	West Extension dam	.08	64
Aug. 19	do		do	.08	55
July 15	Oregon Land & Water Co. canal.	Diverts from Umatilla River.	Near Umatilla	2.18	13.5
Aug. 19	do	do	do	.90	5.5

Deschutes River basin.

Feb. 12	Tumalo Creek	Deschutes River	Below feed canal dam	0.42	1.0
13	do	do	do	1.51	71
Apr. 16	do	do	do	1.46	60
Oct. 7	Columbia Southern canal.	Tumalo Creek	Upper spillway	1.25	15.7
Feb. 10	do	do	do	1.25	16.0
June 1	do	do	do	1.30	18.5
Oct. 7	do	do	Pine Tree Timber Co.	.38	4.0
Feb. 10	do	do	do	.16	6.6
May 31	do	do	do	.18	6.8
Oct. 4	White River	Deschutes River	200 feet below mouth of Clear Creek.		90
June 3	Clear Creek	White River	Clear Lake outlet		13.9
July 8	do	do	do		6.4
Sept. 30	do	do	do		9.4
Oct. 4	Frog Creek	Clear Creek	Near proposed intake		14.4
Apr. 12	Tygh Creek	White River	600 feet above Gordon Creek		8.7
May 25	do	do	do		3.6

White Salmon River basin.

July 17	White Salmon River	Columbia River	Below Big Springs in sec. 25, T. 5 N., R. 10 E.		484

Willamette River basin.

June 12	North Fork of Yamhill River.	Yamhill River	Mouth of Fairchild Creek		16.8
14	do	do	2 miles west of Yamhill		38.7
12	Fairchild Creek	North Fork of Yamhill River.	Near mouth		7.8
13	Turner Creek	do	do		4.5
14	Cedar Creek	do	do		4.3
14	Haskins Creek	do	do		10.8

Rogue River basin.

Oct. 30	Big Butte Creek	Rogue River	Butte Falls Lumber Co.'s mill.		119
July 7	North Fork of Big Butte Creek.	Big Butte	3 miles above mouth, near Butte Falls.		4.9
Oct. 31	do	do	do		4.0
Mar. 30	Emigrant Creek	Bear Creek	Klamath road bridge	4.90	36.3
31	do	do	do		44.0
Apr. 15	do	do	do	4.68	17.8
27	do	do	do	4.47	9.0
29	do	do	¼ mile below mouth of Hill Creek.	1.35	10.6
May 5	do	do	do	1.23	7.2
Apr. 2	Walker Creek	Emigrant Creek	Near mouth	1.00	10.9
15	do	do	do	.86	5.4
May 2	do	do	do	1.25	1.6
2	do	do	do	.58	1.3
Apr. 26	McDonald Creek	Little Applegate River	1 mile above mouth	1.21	13.1
May 3	do	do	do	1.22	15.4
June 6	do	do	do	1.10	9.2
July 9	do	do	do	.74	3.6
Aug. 23	do	do	do	1.09	3.9

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